Commercial Fisheries Abstracts

a monthly summary of important developments for the fishery industries

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JOHN L. FARLEY, Director

Commercial Fisheries Abstracts

Prepared in the Branch of Commercial Fisheries

EDITORS
A. W. ANDERSON, Chief, Branch of Commercial Fisheries
DONALD Y. ASKA, Chief, Educational and Market Development Section

ASSOCIATE EDITOR
MAURICE E. STANSBY, Chief, Pacific Coast and Alaska Technological Research

ASSISTANT EDITORS
KATHRYN L. OSTERHAUG, Fishery Products Technologist, Seattle
F. BRUCE SANFORD, Chemist, Seattle

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Following is a brief outline of this filing system. The numbers apply to the first digit appearing on each card. For the meaning of subsequent digits, please see the above described leaflet.

0	General and theoretical	5	Vitamins
1	Fish by species	6	Fishery byproducts
2	Fresh fish	7	Analytical Methods
3	Preserved fish	8	Composition
4	Oils	9	Miscellaneous

Issued with the approval of the Bureau of the Budget, December 29, 1953

0.5 A NOTE ON THE PRODUCTION OF NITRITE FROM HYDROXYLAMINE BY SOME HETEROTROPHIC BACTERIA

Castell, C. H. and Mapplebeck, E. G. (Fisheries Technological Station, Halifax, Nova Scotia)
Journal of the Fisheries Research Board of Canada 13, 201-206 (March 1956)

Observation.--Fresh cod muscle that was dipped in a solution of hydroxylamine developed small amounts of nitrite when the muscle was held in storage. Sterile cod muscle that was dipped in a solution of hydroxylamine, in contrast, did not develop nitrite when the muscle was held in storage. Fresh cod muscle untreated with hydroxylamine likewise did not develop nitrite in storage. These observations indicate that the origin of the nitrite was hydroxylamine and that it was formed through the activity of microorganisms.

Objective.--The purpose of the study was to determine whether heterotrophic bacteria, and those isolated from fish products in particular, are able to convert hydroxylamine into nitrite.

Experimental.--Various fish-spoilage bacteria were inoculated into a peptone-yeast-beef broth containing approximately 25 parts per million (p. p. m.) of hydroxylamine.

Results.--Many cultures of Pseudomonas were able to convert hydroxylamine, at least in part, into nitrite. Those cultures that were shown to contain a nitrite reducing enzyme also reduced the nitrite obtained from the hydroxylamine. Certain pure cultures of Proteus and Microbacterium also were able to convert hydroxylamine into nitrite. The results are summarized in tables II and III, over. A discussion of the significance of bacteria that oxidize hydroxylamine to nitrite will await quantitative studies.

(over)

 ABSTRACTER: Martin Heerdt

0.7 NEW DEVELOPMENTS ON UNIDENTIFIED NUTRIENTS

Norris, L. C. and Morrison, A. B. (Cornell University)
Proceedings Distillers Feed Conference 11, 55-67 (March 1956)

During 1955 several workers found that the chicks require a mineral or minerals not previously reported to be needed. Chick growth was stimulated by ash from fish meal, gelatin, feather meal, and from distillers dried solubles. Evidence indicates that chicks require an unknown organic growth factor or factors in addition to the unidentified mineral or minerals in the ash of unidentified factor supplements. This paper reviews evidence on unknown nutrients reported in the past year to be required by the chick.

The importance of lipoic acid in practical nutrition is unknown. At times it has been reported to be an essential nutrient, but a quantity of negative results have been published.

Studies on vitamin E deficiency show that hexane-extracted yeast contains a vitamin E-active substance. The unknown factor is not an antioxidant, but functions as a substitute for vitamin E.

One group of workers concluded that dried whey contains a factor different from either the one in fish solubles or the antibiotic fermentation product. However, there is no evidence that maximum response was obtained from any one source from the amount fed in the investigation. In a second report, the authors pointed out that the additive effect obtained with the above products failed to indicate the existence of more than one unidentified growth factor.

When rats were fed an all-vegetable ration, the rats required unidentified growth factors. The factors were found to be present in fish meal, whole liver, liver extract, and dried whey.

(over)

 ABSTRACTER: Neva L. Karrick

0.0 ANNUAL REPORTS 1952 AND 1953 FROM THE (NORWEGIAN) FISHERIES DIRECTORATE CHEMICAL-TECHNICAL RESEARCH INSTITUTE

Heen, E.
Arsberetn. Norg. Fisk., No. 7 (1953) No. 3 (1955)
Wld. Fish. Abstr., 6, 25 (1955)
Food Science Abstracts 28, 156 (April 1956)

The report of the Director of this Institute for 1952 includes an account of work in progress at the following sections: A. 1. chemical analysis of fish and fish products (F. Villmark); A. 2. the microbiology of fresh and processed fish (S. Hjorth-Hansen); the chemistry of marine animal oils (L. Aure); special studies on fish muscle proteins and changes which occur post mortem (J. W. Jebsen and U. Rambech); B. 1. the cooling and freezing of fish (O. Karlsen); B. 2. salted and brined fish products (see Vol. 26, Abstrs. 615, 616 and 617) (Y. Gilberg); B. 3. industrial processing of herring for production of oil and meal, and of dried fishery products for consumption in the tropics (K. Bakken); plant and equipment (E. Sola); and vitamin studies (O. Braekkan). (See also Vol. 26, Abstrs. 113 and 114.)

The 1953 report of the work of the Institute is in the following sections: A. 1. chemical analysis of fish and fish products (F. Villmark); A. 2. the microbiology of fish products (S. Hjorth-Hansen); A. 3. the chemistry of fish oils (L. Aure); special studies of fish muscle protein and changes which occur post mortem (J. W. Jebsen and U. Rambech); B. 1. the cooling and freezing of fish (O. Karlsen); B. 2. salted and dried fish products (see Vol. 26, Abstrs. 615, 616 and 617) (Y. Gilberg); B. 3. industrial processing of herring for production of meal and oil, and of special fishery products for consumption in the tropics (K. Bakken); plant and equipment (E. Sola); and vitamin studies (O. Braekkan). In the technical (B) sections, investigations were concerned with: the preservation of herring for reduction purposes by means of sodium nitrite; packaging materials for herring and fish

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1.85 AUSTRALIAN PRAWNS

Dall, W.; O'Grady, A.; and Kearns, F. J.
Fisheries Newsletter (Australia) 15, 3, 5, 7, 9, 11, 13, 15, 17, 19, 21, 23 (February 1956)

A series of articles covering several aspects of the growing Australian prawn industry make up the February 1956 issue of the magazine, Fisheries Newsletter.

Prawns May Become Dollar Earners.--For some 800 miles along the coast of New South Wales and Queensland, Australia are rich prawning grounds that in 1954-55 yielded a catch of 6.6 million pounds. These facts are becoming known overseas and representatives of several American companies have visited Australia to investigate the possibilities for purchasing Australian prawns.

The United States already imports 40 million pounds of shrimp in addition to its domestic production of some 235 million pounds. Additional sources of supply are still in demand. For this reason the Australians anticipate the growth of a new dollar export trade in prawns.

Identification and Biology of Australian Prawns.--The majority of the prawns caught commercially in Australia belong to the family Penaeidae. Approximately 250 species are known to science. They are usually found in shallow tropical and warm-temperate seas. About 30 species are known to occur in Australian coastal waters, but only six of these are presently of commercial importance. The following are the established commercial species:

Common Name	Scientific Name
King Prawn	Penaeus plebejus
Western Australian King Prawn	P. latisulcatus

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 ABSTRACTER: Kathryn L. Osterhaug

NITRITE FROM HYDROXYLAMINE

NORWEGIAN RESEARCH REPORTS

CHICK NUTRITION STUDIES

AUSTRALIAN PRAWN FISHERY

0.6

fillets frozen in blocks; the freezing of fish in an alginate jelly, and the freezing and cold storage of whole fish in bulk for subsequent filleting and cold storage of fish for subsequent canning; the 'ripening' of salted Icelandic herring; the production of fish meal from lean fish by solvent extraction, with or without the use of proteolytic enzymes, and of fish oils by countercurrent extraction with furfural; and the colour and keeping quality of the flesh of tunny caught in Norwegian waters in relation to the amount of myoglobin present in the muscle.

1.85 (Cross Reference: 1.017)

Tiger Prawn	P. esculentus
Banana or White Prawn	P. merguiensis
Greentail or Greasyback Prawn	Metapenaeus mastersii
School Prawn	M. macleayi

The following are of possible future importance:

Suggested Common Name	Scientific Name
Blue Tiger Prawn; Giant Tiger Prawn	Penaeus monodon
Green Prawn	P. semisulcatus
Offshore Greasyback or Striped Prawn	Metapenaeus monoceros
Brown Prawn or Endeavour Prawn	M. endeavouri
Pink or Rainbow Prawn	Parapenaeopsis sculptilis

The Gear that Takes Australian Prawns.--Prawns are taken in onshore waters, seldom deeper than 30 feet, with otter-trawl gear. The trawl is usually shot and hauled over the stern. At the end of each haul the cod end of prawns is lifted over the side on to the aft deck where the contents are spilled on to a sorting table.

After being sorted and washed the prawns are stowed in the hold with crushed ice. Sometimes coarse salt is scattered among the prawns as they are iced down.

On some boats the prawns are cooked and cooled before being stored in ice.

At the end of each day of fishing most of the prawning vessels return their catch to port. Those vessels that stay on the grounds two or three days before returning to port are equipped to cook the prawns at sea.

Other articles included in this issue of Fisheries Newsletter include, "The Broad View on Exports" and "Shrimp Big Industry in U.S.A.".

0.5 (Cross Reference: 2.01)

Table II. The maximum initial concentrations of hydroxylamine permitting growth in broth cultures for various identified stock cultures and other organisms isolated from fisheries products.

Culture	Hydroxylamine	Culture	Hydroxylamine
	p.p.m.		p.p.m.
A. aerogenes	50-100	Mic. varians	20-50
E. coli	50-100	Mic. citreus	20-30
Sal. enteritidis	50-80	Microb. piscarium	30-100
Prot. vulgaris	50-100	B. subtilis	50-100
Ser. marcescens	80-100	Cl. butyricum	10-50
Alc. ammoniagenes	50-100	Cl. sporogenes	10-50
Ps. fluorescens	20-30	Flavobacter from fish	20-80
Ps. putrefaciens	20-30	Pseudomonas from fish	20-30
Sar. lutea	20-30	Yellow halophiles	100

Table III. The number of days before growth was visible in ten broth cultures initially containing 0 to 100 p.p.m. of hydroxylamine.

Organism	0 p.p.m.	20 p.p.m.	30 p.p.m.	50 p.p.m.	80 p.p.m.	100 p.p.m.
A. aerogenes	1	1	1	2	2	3
E. coli	1	1	2	5	5	6
Ser. marcescens	1	1	2	3	3	5
Microb. piscarium	2	2	3	7	7	10
Mic. varians	2	2	5	10	10	15
B. subtilis	1	3	3	7	10	32
Ps. fluorescens	1	1	0	...	...	...
Ps. putrefaciens	1	3	5	...	...	...
Flav. solare	2	3	5	10	10	...
Sar. lutea	2	3	...	15	...	...

0.7 (Cross Reference: 6.19)

Purified proteins used in the chick test diets may contain unidentified growth factors. Purified casein, gelatin, zein, and fibrin were shown to contain the factors. Gelatin apparently contained both organic and mineral factors.

The growth factors in dried liver were separated by means of Craig's counter-current distribution procedure. Two factors were separated. One was 77 percent soluble in the phenol-n-butanol layer and the other 98 percent soluble in the water layer. The latter contained the mineral constituents of the liver extract.

Improved procedures, including the use of purified diets and fractionation of growth factors, promise that a solution of the problem of unidentified factors will be attained.

Studies were made on the ash of a mixture of unidentified growth factor supplements. The ash itself was growth promoting. As a result of these findings, different minerals and combinations were studied. All have given negative results. The growth promotion may be due to minerals other than those tested, or to mineral imbalance. If further studies show that neither of these theories was the reason for growth promotion, the effects may have been due to a particular combination of unknown mineral elements or to complex mineral ions rather than elements.

The responses obtained from unknown growth factors in chicks fed practical rations were not as great as when purified diets were supplied.

Twenty-seven references are given.

1.87 SUITABLE HOLDING CONDITIONS FOR LIVE LOBSTERS

McLeese, D. W. and Wilder, D. G. (Atlantic Biological Station, St. Andrews, N. B.)
Fisheries Research Board of Canada, Progress Reports of the Atlantic Coast Stations No. 62, 24-28 (July 1955)

Lobsters are held alive in crates, "cars", tanks, and pounds before they are marketed. This holding period varies from a few days to several months. Heavy losses may occur if large numbers of lobsters die because of unfavorable conditions.

Natural water conditions.--The most important factors in holding live lobsters are (1) the water temperature, (2) the salt content of the water, and (3) the amount of oxygen dissolved in the water. Most lobsters live in shallow water at temperatures ranging from about 30° F. in late winter to about 75° F. in late summer. Lobsters normally live in sea water that contains about 3 percent salt by weight, but after heavy rains the salt content near the mouths of rivers may be considerably reduced. Sea water contains dissolved oxygen that has been derived from the air and from marine plant life. Normal sea water at 60° F. contains 8 milligrams of dissolved oxygen per liter or 8 parts per million (p. p. m.) of oxygen by weight. The amount of oxygen that will dissolve in the water decreases as both the temperature and the salt content of the water increase. Where crowded conditions prevail, lobsters cannot satisfy their oxygen requirements.

Acclimation.--If the salt content or the amount of oxygen dissolved in the sea water is suddenly reduced, lobsters will require about 1 week to become acclimated to the new conditions. Lobsters that are caught in 50° F. sea water and transferred to 65° F. sea water will require about 3 weeks to become acclimated to the temperature change.

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 ABSTRACTER: Martin Heerdt

2.00 JELLIED CONDITION IN THE AMERICAN PLAICE HIPPOGLOSSOIDES PLATESSOIDES (FABRICIUS)

Templeman, Wilfred and Andrews, Gertrude L.
Journal of the Fisheries Research Board of Canada 13, 149-182 (March 1956)

A new fishery for American plaice was opened in 1948 in the Newfoundland area on the northwestern, northern, and eastern parts of the Grand Bank. This fishery now yields 30 million pounds of American plaice annually. Sometimes as much as 20 to 40 percent of the catch, however, must be discarded because of a jellied condition of the flesh. Fillets from jellied plaice are glossy and opalescent in contrast to the normal plaice fillets which are firm with a grayish color in the smaller fillets and a white color in the larger fillets. The jellied fillets are objectionable to the customer because of their appearance, condition when cooked, and shrinkage during cooking.

Jellied fillets from American plaice average about 0.2 percent more fat, 4 percent more water, and 4 percent less protein than normal fillets. In terms of total nitrogen jellied fillets show a large reduction in the muscle myosin fraction and an increase in the stroma fraction. Both muscle fiber and connective material are decreased in total quantity in the jellied fillets. Evidence of proteolysis or of the accumulation of proteolytic end products such as would be expected if the sporozoan parasite Chloromyxum were the causal agent is not present. Normal fillets collected in sealed bottles at sea and held on ice showed an average liquid drip of 2.1 percent by weight, on being landed, whereas jellied fillets handled in the same manner showed an average liquid drip of 14.4 percent. One extremely jellied fillet contained 96.18 percent water, 0.06 percent fat, and only 2.83 percent protein.

Commercial packs of plaice fillets include both normal and intermediate jellied fillets. Frozen jellied plaice fillets have considerably more drip on thawing than normal plaice fillets. A probable

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 ABSTRACTER: Martin Heerdt

1.95 UTILIZATION OF SEA LIONS IN ALASKA

Dassow, John A. (Fishery Products Laboratory, Ketchikan, Alaska)
Commercial Fisheries Review 18, 5-9 (January 1956)

Interest has been shown recently in the possibility of commercially utilizing the Steller sea lion, which occurs in excessive numbers in Alaskan waters and which inflicts serious economic loss on the fisheries. Some interest arises from the demand for economical meat, with high-protein and low-fat content, for use as either fur-farm or fish-hatchery feed in the midwestern and western states.

The Steller sea lion is the largest of eared seals, the male weighing up to 2,200 pounds and the female weighing up to 1,000 pounds. It gathers near estuaries to feed during salmon and herring runs. The range of the Steller sea lion is from the islands of southern California northward along the coast into the Bering Sea. It breeds throughout most of its range, gathering during June and July on wave-beaten rocks and islets.

Additional evidence is needed on feeding habits of the sea lions before conclusions can be drawn as to the overall damage to the food-fish industry. Contents of approximately 50 stomachs containing food revealed squid, sand lances, pollock, flounders, sculpin, cod, herring, perch, various scrap fishes--including small sharks and skates--and halibut and sablefish. Federal regulations were amended in 1949 to permit killing of sea lions in the territory of Alaska except on Bogaslof Island and within 1 mile of the shores of Bogaslof Island.

Possibilities of utilizing the sea lions were studied on four specimens obtained during November 1954 to January 1955 in waters adjacent to Ketchikan. The proximate composition of the meat, liver, and blubber from each animal was determined. The blubber was trimmed carefully from the meat

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 ABSTRACTER: John A. Dassow

2.01 FREE AMINO ACIDS IN SHRIMP--CHANGES OCCURRING DURING THEIR DECOMPOSITION

Almeida, Maria Elisa Wohlers de (Inst. Adolfo Lutz, Sao Paulo, Brazil)
Rev. inst. Adolfo Lutz 15, No. 1, 158-67 (1955) (English summary)
Chemical Abstracts 50, 5939 (April 25, 1956)

The immediate post-mortem analysis of the whole shrimp (Penaeus kroyeri) showed the presence of glycine, serine, alanine, proline, asparagine, arginine, glutamic acid, lysine, histidine, valine, leucine, and isoleucine, and traces of aspartic acid, treonine, and phenylalanine. In the edible part, aspartic acid, treonine, and phenylalanine were absent, and lysine, histidine, valine, leucine, and isoleucine were present only in traces. During spoilage (at room temp.), lysine, histidine, glutamic acid, alanine, valine, phenylalanine, leucine, and isoleucine increased considerably, while proline and serine decreased considerably. Tyrosine, α-aminobutyric acid, methionine, and norleucine appeared during spoilage. At 4°, the same occurred considerably more slowly.

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HOLDING LOBSTERS ALIVE

UTILIZATION OF SEA LIONS

JELLIED CONDITION IN PLAICE

SHRIMP DECOMPOSITION

1.95 (Cross Reference: 9.17)

samples. Both meat and liver were high in protein (20 to 24 percent) and were fairly low in oil (1 to 4 percent). The protein content compared favorably with horse meat and with lean whale meat. The liver was approximately 3 percent of the total weight of the animal, and one sample assayed 302,000 spectrophotometric units of vitamin A per pound and had an oil content of 2.8 percent. The meat was dark red and dense. Both the meat and the liver were found to be acceptable as human food but had limited appetite appeal. No feeding tests were made. Other information, however, indicated that the meat would be a suitable food for pets, ranch fur animals, and trout or salmon.

There appear to be several major problems in considering utilization of sea lions: (1) lack of definite information on numbers and availability of animals at central locations; (2) economics and practical aspects of slaughter and recovery of the large animals, either in open water adjacent to rookeries or on the rookeries; (3) economics of meat recovery, estimated lean-meat recovery not over 40 to 50 percent of carcass, necessity of trimming blubber to produce a low-fat product for animal feed; (4) probable necessity of using refrigerated vessel and floater reduction plant for recovering and processing, since summer herds of sea lions school in fairly isolated waters and rookeries some distance from existing cold-storage and reduction plants; (5) problem of hide disposal, leather not suitable for most industrial purposes, possibility of marketing in leather specialty goods.

The most economical operation would be one in which the entire animal could be utilized, enabling the operational costs to be deducted from several products rather than one. The preparation of frozen lean meat for animal feed, the reduction of the remaining carcass to meal and oil, and the preservation and later tanning of hides for the leather specialty market appear to be the most promising possibilities at present.

2.01 (Cross Reference: 1.85)

1.87

Living conditions for lobsters.--Lobsters can be kept alive for several days at high temperatures providing the salt content and dissolved oxygen content remain at normal levels. Lobsters fully acclimated to 40° F. sea water were able to live in 75° F. sea water, whereas those acclimated to 60° F. died if the temperature fell to 40° F. Lobsters are easily killed by shipping them in very cold refrigerator cars during the summer. Lobsters can be held alive in sea water containing as little as 1 percent salt if the sea water is kept cool and well supplied with oxygen. Lobsters can live at considerably reduced oxygen levels (as little as 1 p.p.m. of oxygen) if the sea water is cool and contains the normal amount of salt.

The highest temperatures that hard-shelled, acclimated lobsters can withstand and live in if they are held in sea water containing the amounts of salt and dissolved oxygen shown around the margins of the table below are given in degrees F.

Oxygen in milligrams per litre	Per cent salt content: 0.5	1.0	1.5	2.0	2.5	3.0
	Temperature (°F.)					
1	*	*	*	50	55	64
2	*	*	65	75	78	80
3	*	*	77	79	80	81
4	*	*	78	80	81	82
5	*	50	78	80	82	85
6	*	50	79	81	83	87

Lobsters (uninjured) ready to moult or newly moulted cannot withstand the extreme sea-water conditions that hardshelled lobsters can withstand. Small lobsters (7 to 9 inches) will withstand the same extreme conditions that large lobsters (11 to 13 inches) will withstand. A difference in the ability of lobsters from a certain area to better withstand extreme sea-water conditions could not be proved. Lobsters that are to be held for several months probably should receive some feed particularly if they are new shelled lobsters. If possible lobsters should be held in sea water between 40° and 65° F. and containing not less than 2.0 percent salt and 3 p.p.m. of oxygen.

2.00 (Cross Reference: 1.60)

explanation for the excessive drip is a loose, less firm physical structure in the jellied fillets in which most of the moisture is in the form of lymph in enlarged inter-cellular spaces. The jellied condition is negligible in immature fish. The condition occurs with increasing frequency in large males and females, and very few females in excess of 60 centimeters in length are free from it. Since females grow larger than males the greater weight of commercially caught jellied fish is due to the presence of large females. The Grand Bank is a new fishing area with many jellied plaice. Intensive fishing will in time reduce the number of jellied plaice. Meanwhile, the largest plaice should be discarded at sea.

Examination of plaice samples from many areas of the northwest Atlantic show that where the sea-bottom temperatures are from -1° to 0° C. during most of the year the plaice are large, often plentiful, and show a high percentage of jellied fish among the larger sizes. In deeper or warmer areas such as the Southwest Grand Bank area where sea-water temperatures of 1° to 3° C. prevail, large and jellied plaice are fewer in number. Of the commercial ground fishes in the western Atlantic only in plaice is there definite and extreme jellied condition in a large part of the population throughout the year.

The jellied condition appears to be one of protein emaciation or impoverishment caused by spawning. Specifically, this protein impoverishment is a failure of fish living in very cold water to recover their body protein loss to the sexual products before the gonads, with first call on blood protein, begin to develop again. Because the need for protein apparently can not be met from food sources, body protein is used. As the body protein decreases, water is absorbed to replace it.

2.111 PRESERVATION OF FISHING GEAR - NETS

von Brandt, A.
Hefte zur Rationalisierung der Fisherei No. 4 (1955)
World Fisheries Abstracts 7, 17 (March-April 1956)

The object of the preservation of fishing nets is to protect them from rotting, to give them a color for improving the fishing yield, and to protect them from damage by sunlight. The preservation against rotting is most important. For that purpose the nets are soaked in tannin-containing extracts. To prevent these substances from being washed out, they are fixed on the net twines. The effect of the preservation can be increased by an additional treatment with tar oils. Cutch products under several trade names are preferred to the various other tannin-containing extracts. Salts containing copper and chromate are used for fixing the tannin-containing extracts. Testalin is a special preparation. Of the tar oils, Carbolineum is particularly preferred. Three methods of preservation are described. When preserving the nets with Testalin, they are boiled for 1/2 hr. in a solution containing 2% cutch and 1% Testalin. Then they are dried and boiled again for 1/2 hr. in a solution containing 4% cutch and 1% Testalin and subsequently dried. With the "Dutch preservation" method, the nets are boiled for 1/2 hr. in a solution containing 2% cutch, dried, and then treated with a solution containing 1% $CuSO_4$ and enough liquid ammonia to make the solution dark blue and clear. After being dried, they are boiled again for 1/2 hr. in a solution containing 4% cutch and then a second time in the 1% solution of $CuSO_4$. The "Spezialgerbung" process prescribes also that the nets be boiled for 1/2 hr. in a solution containing 2% cutch and dried. Then they are put for 1 hr. into a solution containing 3% $K_2Cr_2O_7$ and very carefully cleansed. After being dried, the nets are cooked for 1/2 hr. in a solution of 4% cutch, dried, and then treated again with the $K_2Cr_2O_7$ solution. After all the 3 treatments, a soaking in Carbolineum is considered advantageous. The installation of a preservation plant for small and large fishing enterprises, also for co-operative societies is described. Drawings of construction plans are also

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2.12 RECENT EQUATORIAL TUNA RESEARCH

Tester, Albert L. (Pacific Oceanic Fishery Investigations, U. S. Fish and Wildlife Service)
Pan American Fisherman 10, 10-11 (March 1956)

The Pacific Oceanic Fishery Investigations was established in 1949 to evaluate the aquatic resources of the central and western Pacific Ocean. Their program involved more than simply conducting superficial surveys of the abundance of fishes; rather, the plan was to study first the oceanic circulation of the area in order to locate favorable conditions for the existance of commercially valuable species. This reason prompted the selection of the equatorial region south of Hawaii, where there is a suggested upwelling of the surface waters, as the first area for study. Initial research confirmed these enriched waters extended northward to about 5° N. latitude and it was reasoned that this would be unusually favorable circumstances for the existence of tuna.

First attempts to survey the tuna met with sporadic success until the Japanese longline was used. This gear, fished north and south across the equatorial zone, revealed a dense concentration of large deep-swimming yellowfin occupying the area shown on the chart (figure 1). Following this extensive exploratory work, the first attempt to fish commercially was made by two American boats in early 1954. Considering the handicaps of fishing new gear and strange grounds these boats did remarkably well. These efforts were followed by less pretentious attempts that proved less successful. At first it might appear that this was indicative of the usual pattern of good fishing when a new ground is found, followed by subsequent decline. Considering the vast area and the insignificant catch in relation to total population this argument does not seem reasonable. Evidence now on hand relates the decline of tuna abundance to an environmental change in the area and with today's knowledge poor fishing could have been predicted.

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ABSTRACTER: Harold C. Johnson

2.14 ASDIC IN THE FISHING INDUSTRY

Good, C. M.
World Fishing 5, 26-28 (Part 1) (March 1956) and 21-22 (Part 2) (April 1956)

Asdic operates on a principle similar to that in use with the depth finder. Depth finders are pointed straight down and might be compared to a floodlight illuminating an area directly beneath the keel of the ship. Asdic might be compared to a focused searchlight that can be swung to locate objects in a large horizontal area under the surface of the water (figures 1, 2, and 3).

To be useful in commercial fishing, an Asdic must meet a number of requirements: (1) it must be effective in locating commercial concentrations of fish over a relatively large horizontal area; (2) it must be small because space on fishing vessels is valuable; (3) it must be simple to operate because fishermen perform a multitude of duties; (4) it must be rugged because fishing vessels operate in all kinds of weather; (5) it must be inexpensive.

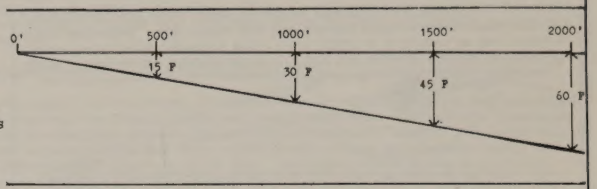


Fig. 2 The depth, in fathoms, of a 10° sound beam at various ranges, given in feet. The upper edge of the beam is parallel to and 6 feet below the surface.

(over)

ABSTRACTER: F. Bruce Sanford

2.3 ANOTHER OYSTER SHUCKER INTRODUCED

Anonymous
Southern Fisherman 16, 59 (March 1956)

A new oyster shucking machine has been invented by a New Orleans man. The machine is a vertical, box-type unit with an opening at the top, five rollers driven by chain belt, openings front and back for oyster meats, and a bottom opening for the balance of the oyster meats and for the oyster shells. The inventer said that the machine is designed to handle 100 barrels of oysters an hour.

When in operation, the steamed oysters will be fed into the machine at the top from a 48-inch wide conveyor belt. They will drop onto the first roller which is composed of a series of striking baffles that revolve slowly. The baffles strike the oysters against the side of the machine to release the meats. The timing is so rigged that as one row of oysters drop onto the rollers, there is an even strike of oysters throughout the operation.

After the meats are released from the shells and come out either through the front of back opening or through the final exit, the meats fall through a shaker where they are accumulated. The shells continue down to the bottom and are carried off by a special conveyor.

Inside the machine are soft sprays of fresh water that act as a lubricant to the passing oysters.

An important factor for proper usage of the machine is the proper temperature and steaming time to insure that the oyster eye will let go of the shell.

See illustration, over.

(over)

ABSTRACTER: Kathryn L. Osterhaug

NET PRESERVATION

EQUATORIAL TUNA RESEARCH

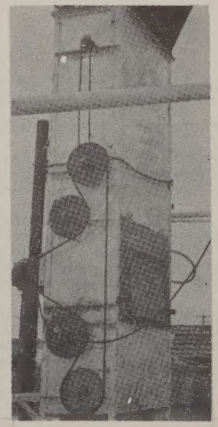
LOCATING FISH WITH ASDIC

MECHANICAL OYSTER SHUCKER

2.12 (Cross Reference: 1.1)

The explanation is that as the cool but fertile upwelled water moves north and south from the Equator the temperature increases causing the following biological succession to take place: the nutrient salts stimulate the growth of aquatic plants which, in turn, support an augmented supply of plankton animals and these, in turn, furnish food for tuna forage. Tuna, of course, may be expected to congregate in areas of large food supply. A decline in this supply would indicate a decrease in water temperature. Variations in the equatorial circulations are related to weather, thus it is conceivable that a more detailed knowledge of weather affects upon ocean water circulation and temperature could lead to long-range forecasts of finding fishing success.

2.3 (Cross Reference: 1.81, 3.33)



2.111

given. The design of a drying place is described, and protective measures for persons carrying out the preservations are mentioned. Instructions are also given for dyeing and increasing the stiffness of Perlon nets. The latter is done by treating them with Black Varnish, which may be diluted with benzene in the proportion of 1:1.

2.14

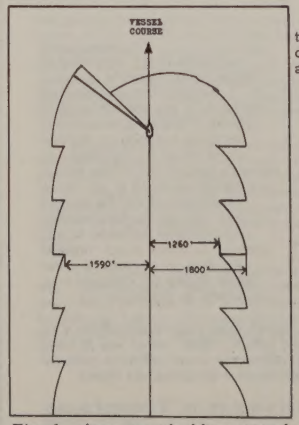
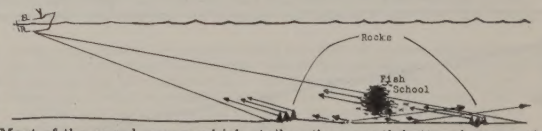


Fig. 1. Area searched by a vessel equipped with Asdic. Range of Asdic 1,800 feet, speed of vessel 10 knots. The Asdic training from port to starboard beams in one minute and then snapping back to port to repeat the operation.

In pointing out the present possibilities and limitations of Asdic, the author discusses the following topics: theoretical considerations, desirable beam shape, directional characteristics, increasing beam angle, optimum operating frequency, and determining cause of echo.



Most of the sound energy which strikes the smooth bottom between the rocks is reflected onward while very little is returned to the receiver to be detected. The rocks and fish school make good targets and return a strong echo to the receiver where it is detected.

Fig. 3. A sound beam of 10° tilted at an angle of 15° below the horizontal. This illustrates the method of finding objects lying in or protruding from a smooth bottom. It also shows a method of finding low lying fish schools in shallow water where the location of roughs is known.

3.12 SPOILAGE OF FISH IN THE VESSELS AT SEA: 3. THE VALUE OF NITRITE ICE AND NITRITE DIPS FOR THE PRESERVATION OF GUTTED FISH IN THE HOLD OF THE VESSEL

Castell, C. H. and Gunnarsson, G. K.
Journal of the Fisheries Research Board of Canada 13, 207-218 (March 1956)

Sodium nitrite as a 1 percent dip or as a 0.1 percent solution incorporated into flake ice was used with eviscerated cod and haddock stored in ice aboard trawlers under normal fishing conditions at sea. The dip in 1 percent sodium nitrite solution immediately before icing the cod and haddock in the hold was more effective as a preservative for cod and haddock than storage in ice containing sodium nitrite. Quality-wise, however, little or no advantage was obtained from using sodium nitrite either as a dip or incorporated in the ice if the fish were properly iced and stored not longer than 6 days. If, however, a sodium nitrite dip or sodium nitrite ice is used on fish caught during the first few days of the trip, the total period of storage in ice can be lengthened by several days.

Sodium nitrite that was incorporated into ice by freezing a 0.1 percent solution in a drum-type ice-making machine had maximum utility with a minimum of effort. Nitrite ice well mixed with fish, iced in boxes, added about 2 days to their keeping time. If, however, nitrite ice was used for icing fish in layers in the pens, variable results were obtained. Fish iced with nitrite ice developed initial spoilage odors at approximately the same rate as fish iced with ordinary ice, but beyond this point the progress of spoilage through the more offensive stages was retarded in fish iced with nitrite ice.

Fish stored either in pens or boxes in ice after they had received a dip in a 1 percent sodium nitrite solution kept at least 4 days longer than undipped fish. Dips of up to 5 minutes duration in a 1 percent sodium nitrite solution resulted in fish with a nitrite content that is permissable in Canada.

(over)

ABSTRACTER: Martin Heerdt

3.239 POST-MORTEM CHANGES IN THE LENSES OF FISH EYES, II. EFFECTS OF FREEZING AND THEIR USEFULNESS IN DETERMINING THE PAST HISTORY OF THE FISH

Love, R. M.
Journal of the Science of Food and Agriculture 7, 220-226 (March 1956)

The development of opacity in the lens medullas (center of the lens) of eyes from North Sea cod (Gadus callarias) and haddock (Gadus aeglefinus) was caused by freezing of the fish when they were cooled to a temperature of at least -4.8° C. if they had not been stored for more than 16 to 18 days in ice before freezing. The characteristic whitening of the medulla was prevented by the removal of water if the fish were packed in dry salt prior to freezing. When the fish were stowed in ice for more than 6 days after freezing and thawing, the outer part or cortex of the lens became opaque, and it was not possible to observe the medulla.

As shown in table I, fresh and frozen cod were distinguished by the appearance of the lens.

Data on the development of turbidity in the lenses of haddock stored in ice indicated that increased storage periods of fish before freezing was related to the increased turbidity. The relative freshness of such fish can be estimated by matching the lenses against a set of standard "lenses" of graded opacity. The method was much less accurate if the fish were subsequently frozen and thawed, and it was only possible to differentiate between fresh and very stale fish. Stowage for 3 or more days in ice after thawing caused the lenses to become more opaque than those from fish kept for 16 days in ice before freezing.

It was shown that opacity in the medullas after freezing was not caused by the mechanical pressure

(over)

ABSTRACTER: John A. Dassow

3.12 EFFECT OF CHLORTETRACYCLINE AND STORAGE TEMPERATURES ON THE QUALITY OF SHUCKED OYSTERS

Boyd, J. W. and Tarr, H. L. A. (Technological Station, Vancouver, B. C.)
Fisheries Research Board of Canada, Progress Reports of the Pacific Coast Stations No. 105, 12-13 (February 1956)

Objective.--Tests were made to determine the stability of shucked oyster meats after various treatments and under various storage temperatures.

Experimental.--Freshly shucked Pacific oysters were rinsed under commercial conditions for 3 minutes in a tank of fresh aerated water to remove loose sand particles. The final temperature of the oysters averaged 58° F. They were then placed on a stainless steel table for further rinsing and sorting before being packed into standard half-pint waxed cardboard containers. Three similar lots of oysters were treated as above except that the rinse water contained 0, 2, and 4 parts per million (p. p. m.) of chlortetracycline (CTC). Three lots of oysters were stored at 32° and 3 lots of oysters were stored at 40° F.

In a second experiment oysters were treated as in the first experiment except that 10 and 20 p. p. m. of CTC were added to the rinse water. These cartons of oysters were stored at 32° and at 50° F.

Examination.--At intervals the viable bacterial content, pH, and organoleptic quality of the oysters were determined.

Results.--The results of these experiments are shown in the table (see over). Since a marked retardation of bacterial growth occurred only with the higher concentrations of CTC, it appears that the

(over)

ABSTRACTER: Martin Heerdt

5.111 A VITAMIN A ISOMER IN THE EYES OF MEGANYCTIPHANES NORVEGCIA

Fisher, L. R.; Henry, K. M.; Kon, S. K.; Plack, P. A.; and Thompson, S. Y. (National Institute for Research in Dairying, University of Reading)
The Biochemical Journal 61, p vi (September 1955)

We have already reported a discrepancy between the chemical and biological assay of vitamin A in the euphausiid crustacean Meganyctiphanes norvegica (Fisher, Kon & Thompson, 1952; Kon, 1954), the biological value being about 60% of that by the Carr-Price test. The cause of this discrepancy has since been investigated and some findings reported (Anonymous, 1955).

Twenty kilograms of Meganyctiphanes were extracted, saponified and chromatographed by our usual methods (Fisher et al. 1952). Fractional chromatography on alumina produced a concentration in the first fractions of a component with an absorption peak at 315 mμ. in n-hexane, and in the last fractions of another component absorbing maximally at 325 mμ. Biological assay of '315' with rats gave a potency of 60% of that of the starting material, which itself would be 60% as active as all-trans vitamin A.

In a further separation of these two components by fractional chromatography, the starting material was 76 g. of eyes of M. norvegica derived from some 20 000 specimens. The '325' component in the last fractions, from its absorption curve, and that of the retinene from it, was all-trans vitamin A. The first few fractions showed a peak at 315 mμ. as before, but with further purification by repeated fractional chromatography after precipitation of sterols, a product absorbing maximally at 311–312 mμ. in n-hexane was obtained.

(over)

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FISH IN NITRITE ICE

ANTIBIOTIC FOR OYSTERS

OPACITY OF FISH EYES

CIS VITAMIN A IN A CRUSTACEAN

3.12 (Cross Reference: 1.81)

organisms which bring about bacterial spoilage of oysters are considerably less sensitive to CTC than are those that normally occur in fish flesh. With stale or spoiled fish, bacterial counts of over 100 million per gram occur, whereas with sour oysters no counts of over 800,000 were observed in the present tests. Treated oysters retained some of the CTC. Shortly after treatment oysters that had been rinsed in water containing 2, 4, 10, and 20 p.p.m. of CTC contained 0.55, 0.63, 1.3, and 3.0 p.p.m. of CTC, respectively. These latter concentrations decreased by 50 to 60 percent after 12 days' storage.

Although CTC did inhibit the formation of the typical sour odor that develops in spoiled oysters, this would not imply satisfactory bacteriological quality.

Oysters with pH values of 6.1 to 6.3 when fresh, declined in pH to values of 5.5 to 6.0 after souring.

Bacterial counts (bacteria per ml.) and organoleptic tests on shucked oysters rinsed with chlortetracycline (CTC) solution and stored for varying periods at different temperatures.

CTC in rinse water (p.p.m.)	0			2		4		10		20	
Storage temperature (°F.)	32	40	50	32	40	32	40	32	50	32	50
Days stored											
Test A—											
1	2,000	—	—	2,000	—	1,000	—	—	—	—	—
4	3,000	3,000	—	2,000	3,000	1,000	1,000	—	—	—	—
6	4,000	8,000	—	2,000	3,000	1,000	1,000	—	—	—	—
8	6,000	11,000*	—	2,000	8,000	2,000	3,000	—	—	—	—
12	17,000*	125,000†	—	15,000	100,000	8,000	30,000	—	—	—	—
14	230,000*	600,000†	—	120,000	800,000	40,000	300,000	—	—	—	—
Test B—											
2	3,500	—	—	—	—	—	—	(0)	—	(0)	—
6	—	—	140,000*	—	—	—	—	—	6,000	—	(0)
10	320,000	—	—	—	—	—	—	61,000	—	1,000	—
15	550,000†	—	—	—	—	—	—	180,000	—	7,000	—

3.12 (Cross Reference: 2.01)

The amount of nitrite absorbed by the fish from solutions of sodium nitrite, however, was dependent upon the size of the fish as well as upon the time in the dip. In some instances fillets cut from fish dipped in the 1 percent nitrite solutions had a pink discoloration in the thin portions near the belly flaps and tail. This discoloration disappeared after a few hours.

TABLE III.--Odour of fillets cut from gutted cod that had been dipped in various concentrations of sodium nitrite and stored in ice up to 11 days. (These fish had previously been stored in ice at sea for 3 days before dipping.)

Days in storage	Concentration of dips						
	0%	0.2%	0.5%	0.8%	1.0%	1.2%	1.5%
3	Good	Good	Good	Good	Good	Good	Good
5	Slight spoilage	Good	Good	Good	Good	Good	Good
6	Stale or sour	Good?	Good	Good	Good	Good	Good
7	Going putrid	Stale or sour	Slight	Good	Good	Good	Good
10	Rotten	Rotten	Sweet and fruity	Stale	Good	Good	Good
11	Rotten	Rotten	Strong, fruity	Sour, fruity	Fruity, stale	Slightly sweet	Slightly sweet

5.111 (Cross Reference: 1.89)

This substance gave a blue colour in the Carr-Price reaction, with an absorption maximum at 618 mμ., and formed anhydro-vitamin A with 0.06N ethanolic HCl, but at a slower rate than all-trans vitamin A. An *n*-hexane solution, shaken with a crystal of iodine in daylight for some 30 sec. showed a change of the peak from 311 to 325 mμ., and an increase of extinction at the maxima (measured at 311 and 325 mμ. respectively) of 36%. This product seemed to be all-trans vitamin A.

These properties of '315' are consistent with its being a cis isomer of vitamin A. Wald & Burg (1955) recently found neovitamin Ab in lobster eyes, and further characterization of the Meganyctiphanes compound is in progress in collaboration with Professor Wald.

3.239 (Cross Reference: 7.89)

of the frozen optic fluids or of the cortex. Mechanical pressure caused opacity of the medulla under certain conditions. The medullas of fresh cod and haddock became opaque when submitted to pressure between the jaws of a pair of broad dissecting forceps. Clarity was completely restored on releasing the pressure, provided the latter had not been too great.

It was concluded that opacity caused by freezing arose from the formation of minute ice crystals in the tissue. On thawing, the ice crystals remained as small pockets of fluid that was not entirely reabsorbed by the tissue unless the freezing was for a short time. When the fish were packed in salt, two factors probably operated simultaneously to prevent opacity from occurring during subsequent freezing. First, the removal of water prevented the ice crystal from growing to the size necessary to cause permanent opacity, and second, the influx of salt lowered the freezing point of the tissue.

Table I

Appearance of the eye lenses of cod stowed in ice for different times before and after freezing

Days in ice before freezing	Days in ice after thawing	Appearance of lens	No. of fish in group
1-14 (inclusive)	0	A	3
1, 3, 7	3	A*	3
10, 14	3	B	3
1, 3, 7, 10	6	B	3
14	6	C	9
3, 7	9	B	3
10	9	C	3
14	9	C	6

* Considerable cloudiness in cortex. A: strongly positive; white medulla plainly seen through cortex. B: weakly positive; medulla only visible when lens held up to the light. C: negative; cortex so opaque as to obscure medulla completely; very fragile.

3.249 REFRIGERATION OF FISH - PART 3. FACTORS TO BE CONSIDERED IN THE FREEZING AND COLD STORAGE OF FISHERY PRODUCTS

Stansby, M. E. (Section 1 and 2); and Pottinger, S. R.; and Miyauchi, D. (Section 3)
Fishery Leaflet 429, 1-65 (January 1956) Fish and Wildlife Service, U. S. Department of the Interior

This leaflet is the third one of a series of five to be prepared on the refrigeration of fish, and this particular leaflet is written in three sections.

Section 1 discusses the changes taking place during freezing of fish. The following topics are included:

1. Temperature changes during freezing.
2. Theories for causes of texture changes resulting from freezing: (a) Reuter's theory; (b) cell-puncture theories; (c) recent theories.
3. Effect of ice crystal size.
4. Advantages of quick freezing: (a) rate of chilling; (b) refrigeration capacity; (c) freezing under pressure; (d) choice of freezing equipment.
5. Thawing and refreezing.
6. Salt absorption.
7. Miscellaneous changes caused by freezing.

Section 2 discusses the changes taking place during cold storage of fish. The following topics are included:

1. Changes in texture of stored fish.

(over)

 ABSTRACTER: David T. Miyauchi

3.5 A SPLITTING TABLE FOR SMALL SALT FISH ESTABLISHMENTS

Legendre, R. and Fougere, H. (Gaspe Fisheries Experimental Station, Grande Riviere, P. Q.)
Fisheries Research Board of Canada, Progress Reports of the Atlantic Coast Stations, No. 62, 7-9 (July 1955)

To save space, time, and labor in salt fish plants the authors designed the compact, low cost splitting table unit (see over). This unit occupies only 10 feet by 16 feet of floor area. It enables a minimum of 5 men, including 2 splitters, to prepare approximately 3,000 to 4,000 pounds of ready-to-salt fish per hour depending upon the size of the fish.

Construction of unit.--The cutting unit is made from aluminum angles and sheets except for the wooden cutting surfaces. The aluminum angles on the experimental unit shown in the pictures, however, are not recommended for commercial use because they are perforated angles which collect debris and are difficult to clean. Solid aluminum angles are available for the construction of commercial splitting table units.

The wooden cutting surfaces are made from 3/4-inch plywood and varnished. These boards are easily detached for cleaning and drying or for replacement. Blueprints of this unit or of a larger unit to accommodate 10 splitters are available upon request from the Gaspe Fisheries Experimental Station, Grande Riviere, P. Q.

Operation of unit.--The letters applied to the unit shown (see over) serve as an aid in an explanation of its operation. Water at 20 pounds pressure is introduced at X through a 1 1/4-inch pipe and allowed to flow through trough K, trough O, trough E, and then down the drain. A small amount of water is also introduced at W from which it flows through trough F, and down pipe Y into trough E.

(over)

 ABSTRACTER: Martin Heerdt

3.30 STUDIES ON THE MANUFACTURE OF CANNED SALMON: THE ODOR IN CANNED SALMON MANUFACTURED FROM FROZEN FISH AS THE RAW MATERIAL

Tanikawa, Eiichi; Motohiro, Terushige; and Shoji, Shigeo
Bulletin of the Faculty of Fisheries Hokkaido University 6, 317-340 (February 1956)

I. Chemical components of the odor of canned salmon made from frozen fish.--The chemical components of the odor which could be separated by steam distillation from canned salmon, were detected by paper partition chromatography with the aide of a detector tube as piperidine, formic acid, formaldehyde, and δ-aminovaleraldehyde. These components were not detected in canned salmon prepared from fresh fish.

II. On the particular odor in the refrigerated warehouse.--The odor in a refrigerated warehouse for fish consists of ammonia, ethylene, formaldehyde, and acetaldehyde.

III. On the oxidative rancidity of salmon fats during cold storage.--The oxidative changes in fresh fish, butylated hydroxyanisole (BHA) treated fish, and stale fish all of which were stored at -15° C. were determined. Oxidation occurred comparatively early during the period of the storage. Oxides and peroxides tended to increase throughout the storage period. BHA inhibited oxidation in samples of salmon stored at 15° C., whereas oxidation in untreated samples of salmon was not inhibited. A sample of salmon which was unfresh in initial quality, oxidized more easily during the storage period than did a fresh sample. This is considered to be caused by the increase of the amount of free fatty acids in salmon fats owing to a decrease in the freshness of the salmon. Hydrolysis of the salmon fats occurred during frozen storage, but the higher fatty acids decomposed to lower fatty acids or aldehydes shortly after they were formed and became the constituents of the odor in the refrigerated warehouse.

(over)

 ABSTRACTER: Martin Heerdt

6.133 SOLVENT EXTRACTION OF MEAT AND FISH OFFAL

Arvidson, H. C. (Jr.)
Iowa St. Coll. J. Sci., 29, 366-367 (1955)
Food Science Abstracts 27, 606 (November 1955)

An abstract of a doctoral thesis. Studies on the pilot-plant scale of the solvent extraction of dry cooked meat and bone scrap, and of fish meal (wet cooked fish scrap), showed that 98.3% of the fat in the meat scrap and 91.6% of that in the fish meal could be recovered. Trichloroethylene extracted more fat than hexane. The highest percentage of fat was obtained from meat scrap with a moisture content of 7%, and from fish meal with a moisture content of 20%. Wetting agents increased the amount of fat recovered from fish meal, but not from meat scrap. Temperature had a greater effect on extractions on the pilot-plant scale than on laboratory extractions. Solvent extraction of meat scrap appeared to be a washing process only, and solvent extraction of fish meal mainly a washing process coupled with a diffusion process taking effect at later stages.

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REFRIGERATION OF FISH

CANNING FROZEN SALMON

FISH SPLITTING TABLE

SOLVENT EXTRACTION OF FISH OFFAL

3.30 (Cross Reference: 1.3)

IV. Changes in the various types of nitrogen in salmon flesh during cold storage. --The solubility of the flesh protein of salmon in 0.2 percent NaOH solution has a tendency to increase with an increase in the length of the frozen storage period. Both volatile base nitrogen and amino acid nitrogen increased during frozen storage, whereas total nitrogen appeared to decrease. Protein in salmon flesh decomposed less than did the fats with respect to the formation of the characteristic odor in canned salmon prepared from frozen fish.

V. Changes in the volatile compounds in salmon flesh during cold storage.--Volatile bases and acids appeared steadily throughout the cold storage period. This tendency was greatest in the sample which was stale in its initial quality, and least in the sample treated with BHA. This indicates that the addition of BHA to fish prevents decomposition of the flesh tissue. In the sample which was fresh in initial quality, the components of the volatile bases were cadaverine and piperidine, whereas in the sample which was unfresh in initial quality, the components of the volatile bases were cadaverine, piperidine, agmatine, and amylamine. Only formic acid was detected in the earlier part of the storage period; whereas in a later stage of the storage period, higher fatty acids than formic acid appeared successively. If cold storage should be prolonged, great quantities of volatile compounds would be formed. The storage of salmon at 0° F. for more than 50 days and the use of salmon which was not fresh in initial quality, must be avoided if a good canned product is desired.

6.133

3.249 (Cross Reference: 3.238, 3.239)

a. Desiccation: adverse effects of moisture loss; minimizing desiccation by proper packaging; minimizing desiccation by proper cold storage practice.
b. Drip in frozen fish: nature of drip; factors controlling drip; cook drip; disadvantages of drip; retarding drip formation.
c. Alteration in texture.

2. Changes in color and flavor of stored fish.
   a. Color changes.
   b. Flavor changes: flavor in fresh and frozen fish; loss of flavor; development of abnormal flavor; mechanism of oxidation of fish oils in frozen fish.
   c. Types of fish most susceptible to color and flavor changes.
   d. Minimizing color and flavor changes: keeping air away from the fish; keeping fish temperature low; avoidance of prooxidants; use of antioxidants.
3. Bacteriology of frozen fish.
4. Minimizing changes occurring during storage.

Section 3 discusses various protective coverings for frozen fish. The following topics are included:

1. Glazes: (a) ice glaze; advantages and disadvantages; recommended procedures; reglazing; (b) other types of glazes, pectinate films, gelatine-base coatings, waxes.
2. Films and wraps: cellophane, polyethylene, aluminum foil, vinylidene chloride film, coated papers.
3. Packages and cartons: self-locking cartons and trays, metal packages.
4. Overwraps: (a) requirements of overwraps; (b) types of overwraps.
5. Factors to be considered in selection of a suitable package.
6. Labeling.
7. Wrapping machines.
8. Shipping containers.
9. Insulated containers.

3.5

The fish supply is in bin A. If the fish is in the round, an employee at position B slits the throat and belly of the fish and passes it on to an employee at C who cuts off the head and eviscerates the fish. The head and viscera are dropped to waste via chute D into the water in trough E. Eviscerated fish go directly to C. Eviscerated fish are pushed into trough F where the blood is washed away with running water. These fish are then picked from trough F by splitters (employees) one at G and another at H. The splitters, who face each other at an angle, remove the soundbone, drop it to waste into chute D, and push the fish, tail end first, into trough K. Split fish are conveyed in water via K to either L or M (or both) as required where the blood and excess pieces of flesh are removed.

Splitting table for small salt-fish establishments, showing side and front view.

3.63 NEW DEHYDRATING METHOD

Anonymous
Food Engineering 28, 161 (March 1956)

U. S. Patent number 2,723, 202 was recently assigned (November 8, 1955) to a new process for preserving cooked food by dehydration. The novel feature of the patent is based on the mixing of some of the food with particles of similar dehydrated food.

Previously cooked and dried food is mixed or arranged in alternate layers to provide channels for the passage of steam and drying air, respectively, through the food during cooking and drying.

In practice, the washed food is sliced or otherwise reduced in size to facilitate dehydration and stabilized or buffered with compounds such as sulfur dioxide or benzoic acid. The food is then cooked by steam, hot air, dielectric heat, or some other form of heating which will not add a substantial amount of water to the food. As the food is cooked, the previously dried portion absorbs flavor and juices from the uncooked portion. Dehydration may be started immediately after the food has been cooked or the cooked food may be frozen and dehydrated from the frozen state.

 ABSTRACTER: Martin Heerdt

5.111 HIGH-POTENCY VITAMIN A_2 OILS FROM INDIAN FRESHWATER FISH

Balasundaram, S.; Cama, H. R.; Sundaresan, P. R.; and Varma, T. N. R. (Department of Biochemistry, Indian Institute of Science, Bangalore, India)
Nature 176, 554 (September 17, 1955)

Vitamin A_1 occurs predominantly in the liver oils of marine fish, whereas vitamin A_2 is found largely in freshwater fish liver oils. The vitamin A_2 content of Indian freshwater fish liver oils was measured spectrophotometrically.

Fresh livers were ground with acid-washed sand and anhydrous sodium sulphate, and oil was extracted with light petroleum (40-60°). The combined extracts were reduced in bulk at low pressure (yield of oil, approximately 5 percent). An aliquot of the oil was saponified, made up to a known volume in spectroscopic cyclohexane, and absorption spectra and colour test were determined without delay using a Beckman spectrophotometer. The assay of the oil was carried out according to the standard spectrophotometric method of Cama and Morton (1953). The vitamins A_1 and A_2 content of these highly potent oils are recorded in Table 1. Investigations by chromatographic technique on the oils were also carried out using 5 percent weakened Merck alumina. The results on one oil are recorded in Table 2.

From the results in Table 1, it is evident that vitamin A_2 predominates largely over vitamin A_1 (A_2/A_1 approximately 9/1). Moreover, the oils have a very high vitamin A_2 content relative to oils previously reported in the literature. Chromatographic investigations show that most of the vitamin A_2 in the oil is present in the ester form without the simultaneous presence of vitamin A_1 ester (presence of 693 mμ band and absence of 620 mμ band with the antimony trichloride colour test on the

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4.29 SELECTIVE ACIDOLYSIS, A METHOD FOR THE SEGREGATION OF DRYING AND SEMI-DRYING OILS

Lanson, H. J.
The Journal of the American Oil Chemists' Society 33, 68-71 (February 1956)

Drying oils contain a number of different fatty acid groups of varying degrees of unsaturation. The value of these oils largely depends on the proportion in which acids having two or more unsaturated groups are present. By removing the more saturated constituents, the performance of the oil as a film-former can be improved.

In a paper by Lanson and Spoerri (1946), a description was given of the thermally copolymerized soybean methyl esters with the reactive conjugated methyl esters from tung oil. The separation of polymerized ester from unpolymerized ester was made in a modified alembic flask, which offers a convenient method of separation. Since then, this method has been improved by Paschke and Wheeler (1949). Data has shown that the presence of the conjugated tung oil esters greatly increases the proportion of non-conjugated polyunsaturated methyl esters which become polymerized. Experiments proved, as was expected, that the more highly unsaturated esters preferentially enter into copolymerizations.

By heating tung oil fatty acids with soybean oil, polymerization of the conjugated acids with the polyunsaturated acids in the soybean oil occurs, together with acid interchange leading to an equilibrium mixture. Extraction experiments have shown that the extracted acids are practically free of conjugation. By employing conditions favoring fatty acid distillation, acidolysis occurs and the less unsaturated acids come off. The acids which come off are essentially non-conjugated and definitely lower in unsaturation than the average unsaturation of the starting oil.

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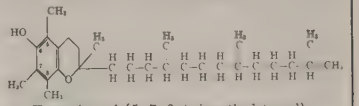
 ABSTRACTER: Edward H. Gruger, Jr.

5.7 ROLE OF VITAMIN E (α-TOCOPHEROL) IN POULTRY NUTRITION AND DISEASE. A REVIEW OF RECENT LITERATURE

Ames, Stanley R. (Distillation Products Industries, Rochester, New York)
Poultry Science 35, 145-159 (January 1956)

Introduction.--Vitamin E or α-tocopherol is a fat-soluble vitamin that is essential for the adequate nutrition of chickens and turkeys. This review has been prepared to summarize the recent scientific literature relative to the role of vitamin E in poultry nutrition.

The seven naturally-occurring forms of vitamin E called tocopherols are shown in figure 1. They differ markedly in biological activity, α-tocopherol being the most active.



α-Tocopherol (5, 7, 8-trimethyl tocol)
β-Tocopherol (5, 8-dimethyl tocol)
γ-Tocopherol (7, 8-dimethyl tocol)
δ-Tocopherol (8-methyl tocol)
ε-Tocopherol (5-methyl tocol)
ζ-Tocopherol (5, 7-dimethyl tocol)
η-Tocopherol (7-methyl tocol)

Figure 1. The natural tocopherols.

Aspects of vitamin E nutrition.--Vitamin E is a multifunctional vitamin. The specific symptoms of a vitamin E deficiency differ greatly with species and conditions. Lack of vitamin E in young poultry often leads to the development of nutritional encephalomalacia or exudative diathesis. Older poultry may develop hock disorders or muscular dystrophy. Vitamin E also has been referred to as the "reproductive vitamin" because a lack of it in poultry manifests itself in embryonic mortality leading to poor hatchability. Biologically, vitamin E functions (1) as a fat-soluble physiological antioxidant, (2) as a physiological synergist, and (3) as a functioning portion of specific

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 ABSTRACTER: Martin Heerdt

NEW DEHYDRATION METHOD

ACIDOLYSIS OF DRYING OILS

VITAMIN A_2 IN FRESHWATER FISH

VITAMIN E IN POULTRY NUTRITION

4.29 (Cross Reference: 4.83)

Fish oil, which contains a very high proportion of saturated and mono-unsaturated acids, can be considerably improved in drying and film-forming properties by treatment with dehydrated castor oil fatty acids.

The description of a typical "acidolysis" is as follows: 800 g. of alkali-refined soybean oil, 200 g. of conjugated linseed fatty acids (conjulin), and 2.4 g. of anthraquinone are placed in a modified 2 liter Claisen flask. The reaction mixture is heated to 300° and held at this temperature for 3 hours with a slow stream of nitrogen bubbling through the oil-acid mixture. The temperature is then lowered to 200°, and a steam generator attached to a gas inlet tube passing into Claisen and beneath the surface of the liquid. Vacuum is slowly applied to a series of traps (dry ice vapor and safety overflow) that are connected to the Claisen side arm. The rate of steam passage is controlled by a stopcock and by the temperature of the water-bath in which the steam generator is immersed. The pot temperature is slowly raised to 275° C. and held there for 5 1/2 hours.

Distillate acids (188 g.) had an iodine value of 99.7, an acid number of 202.0, and 23.1 percent saturated acids (Earle-Milner). The original soybean oil had 13.4 percent saturated acids. The alkali refined soybean oil had an iodine value of 141.5.

Water resistance studies showed a linseed film whitened to a considerable degree, but that the modified soybean oil film, under the same test conditions, developed only a slight haze which disappeared within 10 minutes after removal from the water.

3.63

5.7 (Cross Reference: 4.92)

enzyme systems. α-Tocopherol is the only antioxidant that has been shown to be absorbed through the intestinal wall and deposited in the fat. Feeding vitamin E to poultry improves both body fat stability and meat quality.

Vitamin E deficiency diseases.--Studies of vitamin E deficiencies in rapidly growing poultry have revealed the occurrence of a number of related but distinct syndromes. These are encephalomalacia and exudative diathesis in chicks, muscular dystrophy in ducks, and gizzard erosion and hock disorders in poults.

α-Tocopherol in feeds.--Determination of the total tocopherol content of poultry feeds is relatively easy and most published data on vitamin E content of feeds indicates total tocopherol values. Accurate determination of the α-tocopherol content of poultry feeds and mixed feeds has been very difficult. Brown in 1952 developed a method using paper chromatography for the assay of α-tocopherol and applied it to a number of farm feedstuffs. Brown calculated vitamin E potencies for each feed by using the biological activity of the less effective non-α-tocopherols. The calculated potencies were made by assuming that the biological activities of the individual tocopherols were in the ratio $\alpha:\beta:\gamma:\delta = 100:30:20:1$. The activities assigned to the non-α-tocopherols, unfortunately, were too high, whereas a more nearly correct ratio would be 100:6:1:1.

The α-tocopherol content of 90 feedstuffs have been summarized in tabular form by using all of the available data.

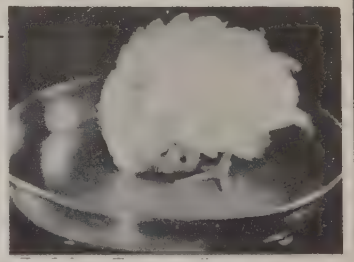

Figure 2. Chick with Encephalomalacia. The predominant clinical symptoms of "crazy chick disease" are ataxia, heat retraction, and spasms of the limb muscles, followed by complete prostration.

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vitamin A_2 ester fraction). Vitamin A_1 is present in the alcohol form only, and a small amount of vitamin A_2 alcohol was also present. This was also confirmed for the other two highly potent oils.

Table 1. Spectroscopic Data on Freshwater Fish Liver Oils using Ultra-violet Spectra and the Antimony Trichloride Colour Test

	Name of species	$E(1\%, 1\text{ cm.})$ 351 mμ vitamin A_2	$E(1\%, 1\text{ cm.})$ 603 mμ vitamin A_2	$E(1\%, 1\text{ cm.})$ 351 mμ vitamin A_1	Corrected $E(1\%, 1\text{ cm.})$ 351 mμ vitamin A_2	Corrected $E(1\%, 1\text{ cm.})$ 325 mμ vitamin A_1
1.	*Callichrous bimaculatus*	259	618	329	211	26
2.	*Ophiocephalus striatus*	285	582	311	200	25
3.	*Wallago attu*	127	307	157	106	11

Table 2. Spectroscopic Properties of Fractions obtained by Chromatography of *Wallago attu* oil on 5 per cent Washed Merck Alumina

Fraction	Solvent	Max. (mμ)	$E(1\%, 1\text{ cm.})$ 350 mμ	Component
1	Light petroleum (40–60° C.)	350, 370, 390	0·121	Anhydrovitamin A_1
2	" "	290, 336·7, 346	1·72	—
3	" "	285, 350	86·90	Vitamin A_2
4	2% ether-light petroleum	330	14·00	ester Vitamin A_1 alcohol
5	5% " "	290, 350, 370, 390	2·25	—
6	10% " "	285, 350	12·65	Vitamin A_2 alcohol
7	15% " "	330, 355, 370	0·933	—
8	20% " "	336·7, 350	0·844	—
9	Ether	330	1·81	Oxidized vitamins A_1 and A_2?

Gross $E(1\%, 1\text{ cm.})$ at 350 mμ of the whole oil, 127·0. Total $E(1\%, 1\text{ cm.})$ at 350 mμ of the fractions, 121·138.
* Expressed in terms of weight of original oil.

6.15 THE CONVERSION OF HERRING STICKWATER TO SOLUBLES
III. PRESERVATIVE ACTION OF PENICILLIN G ON SALMON OFFAL STICKWATER UNDER PLANT CONDITIONS

Thomson, W. A. B.; Jonas, R. E. E.; MacLeod, R. A.; and Idler, D. R. (Technological Station, Vancouver, B. C.)
Fisheries Research Board of Canada, Progress Reports of the Pacific Coast Stations No. 105, 27-30 (February 1956)

Objective.--Decomposition of herring stickwater even at high temperatures is due to the action of bacteria and can be prevented for a reasonable length of time by the addition of very small amounts of penicillin (Parts I and II, this series of Progress Reports, Issue No. 101, pp. 6-9 and 9-11, 1954). To learn whether the laboratory findings would apply under plant conditions, arrangements were made for a test run at a Steveston, B. C. reduction plant.

Experimental.--Salmon offal stickwater at 180° F. and directly from the primary separators was run simultaneously into two storage tanks until each tank contained 7000 gallons. The stickwater was allowed to cool to nearly 160° F. before penicillin G, which is a fairly unstable substance at temperatures above 160° F., was added.

Penicillin G was added at a level of 2 parts per million (p.p.m.) to the tank by dissolving 64 grams (2.2 ounces) of penicillin G in 2.5 gallons of water and stirring this solution into the stickwater with propeller-type agitators in the tanks. Nothing was added to the second tank so that it would serve as the control tank in this experiment. The temperature, total solids content, pH, and odor of the samples in each tank were determined at 12-hour intervals during the cooling period. Propeller-type agitators in both tanks were left running during the test--not a customary practice--to facilitate

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 ABSTRACTER: Martin Heerdt

6.193 OPTIMUM LEVELS OF DISTILLERS DRIED SOLUBLES IN BROILER DIETS AS AFFECTED BY LEVELS OF PRODUCTIVE ENERGY

Runnels, T. D. (University of Delaware)
Proceedings Distillers Feed Conference 11, 48-54 (March 7, 1956)

White Rock cockerel broilers, 10 chicks to a group and 16 groups in all, were placed on the diets shown in table III to determine the most effective level of distillers dried solubles to use in diets that provide calculated productive energy levels of 950 and 1100 Calories per pound. Distillers dried solubles were fed at levels of 2.5, 5.0, and 7.5 percent as one variable and a combination of 2.5 percent of both menhaden fish meal and dried cheese whey as another variable. All groups of chicks were treated alike and transferred to grower batteries when they became 4 weeks old. The respective diets were provided free choice.

The data obtained and reported in table III shows that the groups of chicks that received distillers dried solubles showed a slight improvement in feed efficiency over the negative controls and were slightly and consistently heavier. The differences, however, were not statistically significant at probabilities of 20 to 1. Neither were the differences attributable to the level of distillers dried solubles significant. Any of the levels tested would be satisfactory in practical broilers diets.

The groups of chicks that received menhaden fish meal-dried cheese whey showed an improvement in both growth and feed efficiency. Improvement in growth in these groups was highly significant at a probability greater than 99 to 1.

The largest effect on both body weight and feed efficiency was produced by increasing the energy level of the diet with animal fat. The difference in body weight and feed consumed per pound of gain

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 ABSTRACTER: Martin Heerdt

6.190 JUDGING THE QUALITY OF WHOLE MEAL

Anonymous
Meld. S. S. F., Damsgård, Bergen, No. 4, 63-77 (1953) (Summary in English p. 85)
Food Science Abstracts 27, 620 (November 1955)

Factors concerned in evaluation of the quality of whole meal are being studied. Any superiority of whole meal over ordinary meal is due to the higher content of water-soluble vitamins (riboflavin, pantothenic acid, niacin, choline, and B_{12}) in whole meal. Results of experiments to investigate the effect of the meals on the growth of chicks are summarized; they confirm especially the importance of riboflavin in the diet. Microbiological assays showed that average values in ordinary meal and in whole meal, respectively, were, in mg per kg: riboflavin, 5 and 8; niacin, 70 and 120; pantothenic acid, 17 and 32; and vitamin B_{12}, 0.20 to 0.25 and 0.30 to 0.40. Results of examination of the quality of the protein indicated that stickwater (forming about 20% (dry weight) of the whole meal) is a poor source of protein, the contents of cystine and tryptophan being particularly low. The amino acid composition of ordinary meal is almost ideal; the protein value of whole meal is, however, practically equal to that of ordinary meal. The superiority of whole meal depends upon its content of vitamins, particularly riboflavin. Commercial products are at present of very variable quality.

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6.51 FIFTH PROGRESS REPORT ON SALMON DIET EXPERIMENTS

Hublou, Wallace F.; McKee, Thomas B.; Jeffries, Ernest R.; Sinnhuber, Russell O.; and Law, Duncan K. (Fish Commission of Oregon, Portland)
Research Briefs 6, 10-14 (December 1955)

Objective.--Ten diets, each containing 2 percent salt (NaCl), were evaluated for raising spring chinook salmon (Oncorhynchus tshawytscha) fingerlings on a minimum of 10 percent beef liver.

Experimental.--Ten 25-foot diameter concrete ponds containing water at 40° to 50° F. were used. Each pond contained 5,400 fingerlings of a size that averaged 900 fingerlings per pound initially. The diets contained turbot (Atheresthes stomias), hake (Merluccius productus), shad (Alosa sapidissima), rockfish (Sebastodes sp.), salmon meal, a commercial meal mixture, yellowfin tuna (Neothunnus macropterus) viscera, beef liver, and terramycin. All of the foods with the exception of the dry meals were held in frozen storage.

The daily allotment of food to each diet was computed on a dry-weight basis to be equal to a definite percentage of the body weight of the fingerlings receiving the diet. This percentage was changed from time to time during the experiment to accommodate the feeding activities of the fingerlings. All diets were freshly prepared each morning in part from foods that had been thawed just in advance of their needs. All salmon were fed 3 or 4 times daily and six days weekly. Afternoon feeding was practiced because the fish were more receptive to food owing to the increase in water temperature. Portions of the diets unfed at the end of each day were weighed and discarded.

Approximately 10 percent of the fingerlings in each group were weighed and counted at two-week intervals throughout the experiment to obtain the information needed to calculate their gain in weight

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 ABSTRACTER: Martin Heerdt

PENICILLIN FOR HOLDING STICKWATER

QUALITY OF WHOLE MEAL

DISTILLERS SOLUBLES VS. FISH MEAL

SALMON DIET EXPERIMENTS

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and to calculate the amount of food to be fed during the next period.

Results.--The percentage gain in weight obtained with each of the diets over a 22-week period from June 6 to November 7, 1951, was as follows: (1) a gain in weight of 1,510 percent on a diet composed of equal parts of beef liver, hog liver, and salmon viscera (diet D); (2) a gain in weight of 1,464 percent on diet I plus 11 milligrams of terramycin per kilogram of diet; (3) a gain in weight of 1,275 percent on a diet composed of 10 percent beef liver, 39 percent salmon viscera, 39 percent turbot, and 10 percent salmon meal; (4) a gain in weight of 889 percent on a diet composed of equal parts of beef liver, hog liver, and tuna viscera; (5) a gain in weight of 866 percent on a diet composed of 10 percent beef liver, 39 percent salmon viscera, 39 percent turbot, and 10 percent commercial meal mixture; (6) a gain in weight of 732 percent on a diet composed of 10 percent beef liver, 44 percent salmon viscera, and 44 percent hake. Four diets that brought on anemia and were discontinued contained 10 percent beef liver, 34 or 44 percent salmon viscera, either 34 or 44 percent turbot or 44 percent rockfish fillet scrap, and in 2 of the 4 diets either 10 percent shad or 20 percent commercial meal mixture.

Conclusions.--Salmon on the diet containing shad ceased growth in 10 weeks and suffered high mortalities possibly owing to the vitamin B_1 destroying enzyme, thiaminase, in shad. Turbot, hake, salmon meal, rockfish, and tuna viscera showed promise as dietary components; but the occurrence of anemia and a means of preventing it in diets composed of low levels of beef liver remains to be solved.

6.15 (Cross Reference: 3.14)

obtaining uniform samples of the tank contents at each interval of time.

Results.--With penicillin there was a 2.7 percent loss of solids after 48 hours and a 28 percent loss after 60 hours. The onset of solids loss from the stickwater was delayed for approximately 36 hours. This is somewhat less protection from decomposition than was obtained in the laboratory with herring stickwater. Without penicillin there was a 10 percent loss in solids in the first 24 hours and a 39 percent loss in solids after 48 hours by which time the odor from the tank had become so foul that the contents were discarded. Without penicillin a slight bad smell was detectable after only 12 hours. With penicillin, however, this same smell was not detected until 36 hours had passed. In either case a bad smell was noted before any detectable solids loss had occurred.

Greater protection could be obtained from penicillin if 7.5 grams of penicillin G were added per 1000 gallons of stickwater at 160° F. and 4.5 grams of penicillin G were added per 1000 gallons of stickwater after the temperature had dropped to 140° F. This would require a total of 12 grams instead of 9 grams of penicillin per 1000 gallons of stickwater, but it would ensure a penicillin level that would give the maximum available protection.

Cost factors.--At 8 cents per gram, 9 grams or 1/3 ounce (2 p.p.m.) of penicillin would cost 72 cents for each 1000 gallons of stickwater treated. A 25 percent loss of solids in 36 hours in the stickwater to which no penicillin had been added would amount to a loss of about 350 pounds of solubles per 1000 gallons of stickwater. With solubles worth 3 1/2 cents per pound, the addition of 72 cents' worth of penicillin would prevent the loss of 12 dollars' worth of condensed solubles in the 36-hour period.

Sanitation.--The development of bacterial strains resistant to the action of penicillin must be avoided by draining the storage tanks at frequent intervals, washing them completely free of stickwater and associated solid material, and then spraying the insides of the tank with a solution of a bactericide, which is active against spore-forming bacteria, at least once a week. If the reduction plant is in continuous operation, this cleaning procedure should be performed more frequently and immediately after the tank has been emptied if batch operation is practiced.

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attributable to the increase in energy from 950 Calories to 1100 Calories (8 comparable groups at each level) averaged respectively, 0.31 pounds and 0.27 pounds in 8-week-old broilers. Both values are highly significant.

Distillers dried solubles and menhaden fish meal-dried cheese whey, although dissimilar, produced almost identical effects in growth and feed efficiency in both the 950-Calorie and the 1100-Calorie diets.

TABLE III

AVERAGE WEIGHT GAIN AND FEED EFFICIENCY DATA OF WHITE ROCK COCKEREL BROILERS FED DIETS CONTAINING DISTILLERS DRIED SOLUBLES

Group No.	Treatment	Pen No.	Age in weeks: 4 — Body weight	4 — Feed/lb gain	6 — Body weight	6 — Feed/lb gain	8 — Body weight	8 — Feed/lb gain
			lb	lb	lb	lb	lb	lb
1	O	15	.994	1.974	1.966	2.206	3.087	2.383
2	O+D2.5	12	1.058	1.817	1.982	2.097	3.061	2.289
3	O+D5.0	1	1.024	1.818	2.034	2.036	3.201	2.235
4	O+D7.5	6	.954	1.848	1.951	2.045	3.026	2.228
5	O +FW	11	1.126	1.765	2.120	2.006	3.213	2.191
6	O+D2.5+FW	14	1.172	1.818	2.170	2.073	3.330	2.255
7	O+D5.0+FW	13	1.161	1.774	2.148	2.005	3.304	2.174
8	O+D7.5+FW	2	1.150	1.767	2.203	1.974	3.279	2.202
9	O +E	10	1.127	1.765	2.200	1.963	3.341	2.024
10	O+D2.5+E	7	1.217	1.581	2.264	1.742	3.405	1.917
11	O+D5.0+E	16	1.196	1.529	2.191	1.770	3.340	1.934
12	O+D7.5+E	4	1.276	1.586	2.405	1.835	3.564	2.037
13	O +FW+E	8	1.242	1.557	2.408	1.745	3.625	1.923
14	O+D2.5+FW+E	3	1.254	1.537	2.402	1.766	3.656	1.958
15	O+D5.0+FW+E	5	1.243	1.599	2.310	1.801	3.463	1.964
16	O+D7.5+FW+E	9	1.300	1.555	2.424	1.788	3.633	1.975

O — Basal
D — Distillers Dried Solubles at levels of 2.5, 5.0 and 7.5% as indicated.
FW — Menhaden fish meal and dried cheese whey each used at levels of 2.5%.
E — Animal fat added to increase the productive energy content of the diet from 950 to 1,100 Calories per lb.

6.3 A COMPARISON OF THE PROPERTIES OF VARIOUS PREPARATIONS OF SODIUM ALGINATE

Vincent, D. L., Goring, D. A. I., and Young, E. Gordon (Maritime Regional Laboratory, National Research Council, Halifax, N. S., Canada)
Journal of Applied Chemistry 5, 374-378 (August 1955)

Fifteen specimens of sodium alginate from various brown algae, including species of Laminaria, Fucus and Ascophyllum, have been prepared in the laboratory or obtained from commercial sources. Tests on these samples included measurements of optical rotation, ionic mobility, rate of sedimentation, viscosity and content of sulphated ash. The results of these tests appear in table I, below.

Comparison of some properties of various preparations of sodium alginate

	Specimen No.	Source	$[\alpha]_D^{20°}$	Viscosity in centistokes $c = 0.25\%$	$[\eta]$	$\mu \times 10^4$ cm.^{2} sec.$^{-1}$ v.$^{-1}$	S_{40} in S $c = 0.5\%$
L	1 F. vesiculosus	Nova Scotia	−142°	2.88	5.48	3.1	1.4
	2 "	"	−141°	13.9	12.62	2.5	1.6
	3 L. digitata	"	−128°	5.11	6.72	3.0	1.4
	5 "	"	−133°	7.65	10.33	3.0	1.6
	8 A. nodosum	Scotland	−131°	5.7	8.50	3.1	1.5
	9 L. digitata	"	−134°	5.6	8.88	2.9	1.3
C	1 L. agardhii	Nova Scotia	−128°	20.49	19.22	3.1	1.6
	2 L. digitata	Norway	−127°	5.07	10.52	3.2	1.4
	4 L. cloustoni	Scotland	−141°	7.69	11.23	3.0	1.5
	5 A. nodosum	"	−132°	8.94	12.68	3.0	1.4
	6 Macrocystis (?)	California	−123°	2.89	7.00	3.1	1.5

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6.72 RECOVERY OF COD BILE

Dugal, L. C. and Laframboise, A. (Gaspe Fisheries Experimental Station, Grande Riviere, P. Q.)
Fisheries Research Board of Canada, Progress Reports of the Atlantic Coast Stations, No. 62, 10-12 (July 1955)

The gall bladder of codfish contains bile that can be used in the preparation of pharmaceutical products.

Objective.--The authors proposed to determine the yield of bile obtainable from cod viscera which is presently discarded as waste, and to develop a method for collecting cod bile.

Yield.--The first lot of 25 cod from which bladders were recovered yielded from 1.5 to 9.0 or an average of 3 grams of bile per bladder. A second lot of 33 cod yielded an average of 6.1 grams of bile per bladder, but 3 of the gall bladders in this group yielded 25, 34, and 82 grams of bile, respectively. A third lot of 9 cod yielded an average of 29.7 grams of bile per bladder.

To obtain more truly representative values the authors obtained the viscera from 3 different 1000-pound lots of dressed cod from a local fish plant. Each of these 3 lots of viscera from 1000 pounds of dressed cod yielded about 454 grams of bile. At the rate of 170 cod per 1000 pounds of dressed cod, the average yield of bile is 2.6 grams per individual cod or bladder. This is a low yield by comparison with the other experimental yields, but no precaution is taken to keep the gall bladder intact when eviscerating cod in fish plants because the viscera is considered to be waste material. In the 3 large lots of viscera examined, many of the gall bladders could not be found and many more had been ruptured and contained no bile.

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ABSTRACTER: Martin Heerdt

6.73 FREE OF THE WHALE'S WHIM (AMBERGRIS)

Anonymous
Chemical Week 78, 61 (February 4, 1956)

Swiss chemists, Max Stoll and Leopold Ruzicka, have recently synthesized ambergris, a rare ingredient of perfumes. Ambergris is ordinarly found in the stomachs of whales. Now, after 30 years of research, the Swiss firm that employs these two chemists is ready to ship the first commercial batches of synthetic ambergris.

Synthetic ambergris is presently selling for $1.09 a pint as compared with natural ambergris at $9.76 a pint on an equivalent strength basis. Furthermore, perfume manufacturers can now count on uniform quality and strength in plentiful supply. As a result of the tremendous reduction in price, ambergris will now be available for use in inexpensive perfumes.

Chemists will not be complacent over the synthesis of ambergris, for a new method of synthesis usually brings to light new techniques and compounds of value to the entire chemical industry. The synthesis of ambergris may be useful in other chemical fields, for example, steroid chemistry. At least one firm is seriously investigating the aphrodisiac properties of ambergris for its potential use in animal husbandry. Ambergris is believed by others to have medicinal properties. Investigation of these properties has been hampered until the present by a lack of a constant and reproducible source of supply of ambergris.

Two other firms are presently interested in producing ambergris. A firm in Holzminden, Germany reportedly is offering ambergris for sale, whereas the other firm, which is located in New York, believes that ambergris can be synthesized by methods other than those outlined in the patent

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ABSTRACTER: Martin Heerdt

7.641 THE ESTIMATION OF VITAMIN-B_{12} ACTIVITY IN FEEDING STUFFS WITH LACTOBACILLUS LEICHMANNII AND OCHROMONAS MALHAMENSIS

Shrimpton, D. H.
The Analyst 81, 94-99 (February 1956)

A detailed description is given of assays using Lactobacillus leichmanii and Ochromonas malhamensis for vitamin B_{12} activity in feedstuffs. The samples for L. leichmannii assays were extracted by autoclaving them for 30 minutes at 15 pounds pressure with 20 ml. of a 1 percent solution of sodium acetate at pH 4.5 and with 0.01 percent potassium cyanide. Two extracts were prepared for each assay. Samples for O. malhamensis assays were extracted in the same manner, except that sodium acetate was omitted.

The results for vitamin B_{12} activity of the feedstuffs was as follows:

The Vitamin-B_{12} Activities of Feeding Stuffs for O. malhamensis and for L. leichmannii

Feeding stuff	Standard vitamin-B_{12} activity per g. of dry feeding stuff for O. malhamensis μg	L. leichmannii μg
Herring meal	0.16	0.18
Whale-meat meal	0.053	0.092
Meat and bone meal	0.048	0.061
Dried skim milk	0.036	0.028
White-fish meal	0.028	0.061

(over)

ABSTRACTER: Neva L. Karrick

6.72 (Cross Reference: 1.5)

An average yield of 2.6 grams of bile per bladder, therefore, cannot be considered as the true yield of bile from cod. Since gall bladders with less than 5 grams of bile could not be economically salvaged on a commercial scale, the true yield is not of great importance.

Collecting the bile.--To remove the gall bladder from cod it is necessary to cut the fibrous tissues by which it is attached to the intestine and also the bile ducts. This is a delicate operation if no bile is to be lost because the bladder must be lifted with one hand while the ligaments are cut with a knife in a restricted amount of space. The least cut on the bladder membrane will release the bile, which is then lost.

To collect bile without removing the bladder, the authors set up a suction apparatus made from laboratory ware and composed of an aspirator to provide the necessary vacuum, a suction flask to collect the bile, an injection needle to pierce the bladder membrane, and flexible tubing to join the various pieces of apparatus into a unit. Frothing and the loss of bile from the suction flask was overcome by releasing the vacuum in the flask through an opening in the tubing near the needle. This opening is closed temporarily with one finger as the needle is inserted into the bladder. The collection of bile with this suction apparatus was not only practical but also more economical than removing the gall bladder with a knife.

Economics.--The cost of obtaining cod bile is almost exclusively a matter of the labor involved. At the present price for cod bile it is doubtful if the selling price would equal the cost of recovery. Therefore, the utilization of cod bile is very unlikely unless the selling price rises considerably.

7.641

Other workers have reported studies on the correlation between vitamin B_{12} activity of animal byproducts for L. leichmannii and for the chick. In a number of cases there was agreement. When the results did not agree, activity for the chick was greater than for L. leichmannii. Thus, in the comparison of microbiological methods, a better method than that using L. leichmannii would give similar or greater results. This is not true of O. malhamensis for the feeding stuffs studied in this work.

6.3

Specimen No.		Source	Sulphated ash %	Degree of Polymerization D. P.	Particle weight	State of purity: From sulphated ash %	State of purity: From titration %
L 1	F. vesiculosus	Nova Scotia	33.2	320	64,000	92.6	88.7
2	"	"	31.6	730	146,000	88.1	76.0
3	L. digitata	"	49.0	390	78,000	?	61.7
4	"	"	33.4	210	42,000	93.0	90.2
5	"	"	35.9	600	120,000	100	95.8
6	"	"	34.3	240	48,000	95.7	99.6
7	"	"	35.5	390	78,000	98.9	98.0
8	A. nodosum	Scotland	34.3	490	98,000	95.6	87.2
9	L. digitata	"	34.0	520	104,000	94.7	96.5
C 1	L. agardhii	Nova Scotia	33.9	1110	222,000	94.6	87.7
2	L. digitata	Norway	36.7	610	122,000	?	95.4
3	?	"	32.8	820	164,000	91.5	97.3
4	L. cloustoni	Scotland	34.7	650	130,000	96.7	97.0
5	A. nodosum	"	34.0	740	148,000	94.7	94.6
6	Macrocystis (?)	California	35.0	410	82,000	97.5	91.8

F= Fucus
L= Laminaria
A= Ascophyllum

6.73

of the Swiss firm.

The patents granted to the Swiss firm tell of the isolation of two key intermediates from ambreine, the main constituent of ambergris. These intermediates are: (1) gamma-dihydroionone ($C_{13}H_{22}O$), which is responsible for odor and (2) ambreinolide ($C_{17}H_{28}O$), which is a gamma lactone that gives fixative properties to perfumes. Fixative properties of a substance are its properties of holding and enhancing other odor components of a perfume blend.

Stoll and Ruzicka, by selectively oxidizing these two intermediates uncovered a number of products including an unsaturated oxide, epoxides, and ketones all of which contribute to the ambergris odor and its fixative properties. All of the aforementioned compounds have been synthesized from starting materials derived from a source other than ambergris.

An intramolecular acetal ($C_{18}H_{30}O_2$), which is the most recently discovered derivative, is believed to be the last secret of the ambergris odor. This acetal is prepared by oxidizing manool ($C_{20}H_{34}O$), a readily available diterpene alcohol that is obtained from the wood of the Dacrydium family.

7.43 MOISTURE DETERMINATION OF SALT FISH

Hennessey, J. P. (Fish Inspection Laboratory, St. John's, Newfoundland)
Fisheries Research Board of Canada, Progress Reports of the Atlantic Coast Stations No. 62, 3 (July 1955)

A rapid method for the determination of moisture (water) in salt fish is essential if a number of determinations are to be made daily.

Objective.--Moisture in salt codfish was determined by 3 different methods so that the accuracy of the methods could be compared.

Experimental.--Samples of salt codfish were dried (1) in an air oven at 221° F., (2) by toluene distillation at 230° F., and (3) in a current of 230° F. air in a moisture tester. Methods 1 and 2 are widely used standard methods. Method 3 is based on the use of a commercial moisture tester made in Detroit, Michigan and known as a moisture teller. A 50-gram sample of minced salt fish and a drying time of 30 minutes were used for each determination made in the moisture teller.

Results.--The moisture data obtained by drying samples of salt fish by each of the three methods are shown in the table (see over).

Conclusions.--The data obtained indicates that all three of the methods appeared to be acceptable for the determination of water in salt fish. The moisture teller method had the advantage of convenience, however, extra precaution is required to avoid scorching the sample if temperatures in excess of 230° F. are used for drying.

(over)

 ABSTRACTER: Martin Heerdt

7.89 A RECORDING STRAIN-GAGE DENTURE TENDEROMETER FOR FOODS. I. INSTRUMENT EVALUATION AND INITIAL TESTS

Proctor, Bernard E.; Davison, Sol; Malecki, George J.; and Welch, May (Department of Food Technology, Massachusetts Institute of Technology, Cambridge, Massachusetts)
Food Technology 9, 471-477 (September 1955)

A new method for objectively determining the tenderness of foods is described whereby quantitative evaluations are obtained in an apparatus fitted with human dentures, mechanically arranged to simulate frequency and motions of chewing. The opposition to chewing motions caused by placing food between the teeth is rapidly and accurately indicated by strain gages of the electrical resistance type appropriately situated on the apparatus. The continuous amplified output from the strain gages during all portions of the chewing cycle is fed into a cathode ray oscilloscope, and traces on the face of the cathode ray tube are photographed with a Polaroid Land Camera. The precision of the strain-gage denture tenderometer is evaluated by observations of deflections obtained (1) when a calibrated mechanical spring is inserted in the apparatus and (2) when a pad of resilient sponge rubber is placed between the teeth with the mechanism arranged so that no destruction of the rubber occurs. Initial results obtained in tests on several foods and results obtained in comparison of the apparatus with a conventional mechanical instrument are reported. A general evaluation of the apparatus is presented, based on conclusions concerning data obtained.

See illustrations, over.

(over)

 Authors' summary

7.642 RECENT DEVELOPMENTS IN STUDIES ON GROWTH FACTORS FOR RUMEN MICROORGANISMS

Bentley, Orville G. and Klosterman, Earle W. (Ohio Agricultural Experiment Station)
Proceedings Distillers Feed Conference 11, 11-15 (March 7, 1956)

Introduction.--Rumen fermentation in vitro is a laboratory tool that can be used in the isolation of a growth factor from natural materials. This method of assay, however, depends upon results obtained from animal feeding experiments for the final evaluation of substances having growth factor activity for rumen microorganisms.

Experimental materials.--Rumen inoculum for rumen fermentations was prepared from rumen juice obtained from a steer that had been fitted with a permanent fistula and maintained on a diet of alfalfa hay. Whole rumen juice obtained from this steer was strained and then supercentrifuged to yield a sediment fraction. A rumen inoculum was prepared from this fraction by suspending the sediment from 40 milliliters of rumen juice in 8 milliliters of phosphate buffer, which had been adjusted to pH 7 and fortified with 0.4 milligrams of cysteine. Media for the fermentations was composed of 1 percent wood cellulose, minerals, 0.0168 percent urea, 0.1 percent glucose, and water. All fermentations were carried out in 8-ounce bottles.

Experimental procedure.--All of the natural materials tabulated (see over) were assayed for growth factor activity. Each 8-ounce bottle received 100 milliliters of media, rumen inoculum, and one of the materials in the amount shown in table 1 (see over). Each bottle was then gassed individually with carbon dioxide to flush out air and held in a water bath maintained at 38° to 39° C. to allow fermentation to occur. After a 30-hour fermentation period, microbial activity of the natural material was determined by analyzing (1) for residual cellulose, and (2) for the increase in trichloracetic acid

(over)

 ABSTRACTER: Martin Heerdt

8.0 COMPOSITION OF FRESH-WATER FISH--NO. 1

Karrick, Neva L.; Clegg, William; and Stansby, Maurice E.
Commercial Fisheries Review 18, 13-16 (February 1956)

Various species of fresh-water fish are being analyzed to determine their proximate composition. An important part of the project is an attempt to determine the variation in composition within a species. It was not possible to determine for all species the effects of location of catch, seasonal variation, and yearly variation. Sheepshead (Aplodinotus grunniens) was chosen for thorough study because of its wide distribution.

The greatest variation in the composition of sheepshead appeared to be in the oil content that ranged from 0.72 percent to 20.36 percent. The oil analyses are reported in table 1 (see over).

The results in the table indicate the danger of analyzing one fish, or even one large lot of fish from the same source, and reporting that the values obtained are representative for that species. Sheepshead caught in the Mississippi River apparently contain the most oil. Those from the small lakes apparently contain less oil than do those from either Lake Erie or the Mississippi River.

In these samples the protein content ranged from 14.5 to 19.9 percent and the ash from 0.87 to 1.29 percent. Since the moisture content is related to oil content, a greater variation occurred. The range was from 66.8 to 84.8 percent.

In addition to the thorough study on sheepshead, 16 other species have been analyzed for their proximate composition. An unusual composition was found for Siscowets lake trout (Cristivomer namaycush siscowet). In 15 of these fish the oil content ranged from 6.7 to 64.2 percent, the protein

(over)

 ABSTRACTER: Neva L. Karrick

WATER IN SALT FISH

GROWTH FACTOR ASSAY WITH RUMEN

DENTURE TENDEROMETER FOR FOODS

FRESH-WATER FISH ANALYSIS

7.642 (Cross Reference: 6.193, 8.64)

precipitable nitrogen which is an indication of ammonia nitrogen utilization.

The findings summarized in table 1, below, indicate the presence of growth factors in a number of materials including condensed fish solubles.

TABLE 1
THE GROWTH FACTOR ACTIVITY OF VARIOUS NATURAL MATERIALS AS DETERMINED *in Vitro*[1]

Material added to flasks	Amount added per flask	Relative activity[2]
None	...	0
Rumen juice	10 ml	100
Yeast extract (Difco)	0.1 gm	94
Dried whey	0.5 gm	60
Brewers' dried yeast	0.1 gm	87
Distillers Dried Solubles[3]	0.1 gm	63
Distillers Dried Solubles (Blended Sample)[4]	0.2 gm	85
Condensed fish solubles	0.1 to 0.2 gm	80-90
Blackstrap molasses	0.1 gm	96
Corn steep liquor	0.2 gm	95
Hot water extract of alfalfa leaf meal	1.0 gm	101
Hot water extract of good timothy hay	1.0 gm	70
Hot water extract of poor timothy hay	1.0 gm	71
Hot water extract of corn cobs	1.0 gm	23
Liver extract, Armour's 1-20	0.1 gm	46

[2]Based on an average amount of cellulose digested in 30 hours.

8.0 (Cross Reference: 1.92)

from 5.9 to 17.8 percent, and the moisture from 27.8 to 74.8 percent. The 15 fish were caught in Lake Superior in September and thus the differences were not due to seasonal or geographical factors.

Many species of fresh-water fish are yet to be analyzed, and additional batches of the species that have been tested must be analyzed before values for composition can be established.

Table 1 - The Oil Content of Sheepshead (Aplodinotus grunniens) from Several Sources

Location Where Caught		Date Caught		Fish in Lot	Oil Content of Fish		
Body of Water	State	Month	Year		Maximum	Average	Minimum
				Number	(Percent)		
Lake Erie	Ohio	Oct.	1951	16	8.60	5.97	2.70
		June	1952	16	10.30	6.90	2.20
		Aug.	1954	16	9.65	6.04	1.17
Mississippi River	Iowa (Clinton)	May	1952	16	13.09	7.15	1.87
		May	1953	15	14.20	8.39	1.45
		Aug.	1953	16	11.30	7.34	1.52
		June	1954	16	14.20	8.78	3.57
		June	1955	16	13.30	5.50	3.23
	Wisconsin (La Crosse)	Aug.	1953	11	16.00	9.68	2.61
	Minnesota (Lake Pepin)	Aug.	1955	16	20.36	11.53	5.54
Lake Winnebago	Wisconsin	July	1953	16	15.30	2.72	0.56
		Jan.	1954	16	3.83	1.53	0.50
		Sept.	1954	16	14.60	2.70	0.91
		Feb.	1955	16	15.34	4.04	0.74
Red Lake	Minnesota	Aug.	1954	16	9.10	4.33	1.63
Clearwater Lake	Minnesota	May	1953	16	1.67	1.04	0.72
Lake Kegonsa	Wisconsin	Oct.	1954	16	8.84	4.89	2.00

7.43 (Cross Reference: 3.5)

Comparison of percent moisture content by different methods.

Sample No.	Air Oven 221°F.	Toluene Distillation 230°F.	Moisture Teller 250°F.
1	38.42	38.15	37.7
2	47.09	46.20	46.7
3	45.25	44.85	45.0
4	47.25	47.00	47.2
5	45.36	46.35	45.0
6	43.16	43.95	43.3
7	45.16	44.85	44.2
8	38.60	37.50	37.4
9	40.91	40.00	40.1
10	40.64	41.00	40.0
11	44.57	43.00	43.0
12	42.39	39.95	41.8
13	41.06	40.00	40.4
14	60.16	60.70	60.0

7.89

Figure 2. Photograph showing placement of different parts of strain-gage denture tenderometer.

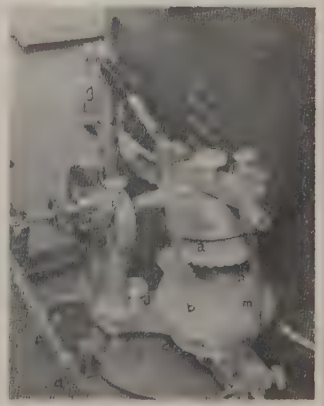

Figure 3. Details of articulator of tenderometer showing its mechanical adaptation for continuous chewing motions. a, a, plastic dentures; b, plastic material; c, swivel point; d and e, beams activating lateral and vertical movements, respectively, of articulator; f and g, springs to take up any excess force on beams; h, h, condylar adjustments; j, j, lateral adjustments, and k, k, central adjustments to vary lateral motion of articulator; l, strain gages; m, incisal pin.

8.42 THE SODIUM AND POTASSIUM CONTENT OF BRITISH COLUMBIA SEA FOODS II. SOME COMMERCIALLY IMPORTANT FRESH FISH

McBride, J. and MacLeod, R. A. (Technological Station, Vancouver, B. C.)
Fisheries Research Board of Canada, Progress Reports of the Pacific Coast Stations No. 105, 19-21 (February 1956)

Part I, which was concerned with the level of sodium and potassium in dietetic packs, appeared in Progress Report No. 101, 17-19. This report presents the sodium and potassium levels in the flesh of a number of species of fish caught in commercial quantities in British Columbia coastal waters.

Three slices--one from behind the head, one from the mid-section, and one from just ahead of the tail--were removed from each fish. The skin and bones from the three slices was removed and discarded and the flesh was pooled and homogenized. Samples of the homogenate were analyzed for sodium and potassium by the use of a flame photometer attachment for a Beckman DU spectrophotometer.

The table (see over) shows the levels of sodium and potassium in the raw flesh of salmon (5 species), ling cod, grey cod, halibut, and herring. The sodium content of spring salmon (Oncorhynchus tshawytscha) of the same size caught at different times during the season, and of spring salmon of different sizes caught at the same time varied considerably. This variation in sodium content of the flesh with size of fish also occurred in coho salmon. Considerable variation existed in both the sodium and potassium content of the flesh of sockeye salmon that were quite uniform in size and caught over a short period of time.

The sodium content of the flesh of large halibut was slightly higher than that of the small halibut. Grey cod and herring contained more sodium and somewhat less potassium than the other species of fish investigated.

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 ABSTRACTER: Martin Heerdt

9.3 FISHING LAWS CHANGED

Anonymous
National Fisherman 36, 21 (July 1955)

California's commercial fishing laws underwent sweeping changes as the result of legislation signed into law by Gov. Knight recently. Most important was the Coolidge Law, introduced by Assemblyman Coolidge of Santa Cruz. It provides the following: (1) sets an annual bag limit for two years commencing July 1 of 3,000 lbs. of yellowtail for canning; (2) sets new anchovy bag limits for canning 21,000 tons from Sept. 1 to March 30, 1956, 35,000 tons from April 1, 1956 to March 31, 1957; (3) establishes minimum size of five inches for anchovies for any purpose except bait; (4) provides for Fish & Game Commission regulations to make possible administration of above seasonal limits; (5) continues prohibition against canning sardines in summer; (6) continues until December 31, 1957 the present tax rate of $1.00 per ton of sardines, Pacific and jack mackerel, squid, herring and anchovies for support of the California Marine Research Committee; (7) changes membership of Marine Research Committee, present five sardine packers remain with four public representatives including one each from organized labor and organized sportsmen.

Lobster regulations also were revamped under terms of a bill which provides the following: lobster minimum size now 3 1/4 inches from eye socket to rear edge of body shell. Black abalone may be used for lobster bait at the Channel Island only.

Baited hoop nets not over three feet across may be used at any time in District 19 and District 18 south of Pt. Arguello to take rock, red and yellow crabs. All traps must have escape openings.

Traps may be used only during the open season to take lobsters, rock crabs and sheepshead.

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 Reprinted in whole

9.15 THE RELATION OF STOCK DENSITY TO "MILKINESS" OF LEMON SOLE IN UNION BAY, B. C.

Forrester, C. R. (Biological Station, Nanaimo, B. C.)
Fisheries Research Board of Canada, Progress Reports of the Pacific Coast Stations No. 105, 11 (February 1956)

By 1951 a dense stock of large mature lemon sole (Parophrys vetulus) had accumulated in the Union Bay area of Baynes Sound off the east coast of Vancouver Island as a result of the closure of the area to commercial trawling in 1947. The Union Bay area was reopened to trawlers in October 1951 for 2 days. Approximately 165,000 pounds of lemon sole were caught by Vancouver and Victoria trawlers during the 2-day period.

A condition of the flesh known as "milkiness" forced rejection of 21 percent of the total landings of these lemon sole. In October 1952, a second experimental fishery was authorized, and the trawlers took a total of 252,000 pounds of lemon sole in 3 days of fishing. Losses up to 12 percent owing to milkiness were experienced, but on the average not more than 8 percent of the total landings were milky. By 1953 and 1954 the "milkiness" condition was present in less than 1 percent of these lemon sole.

According to Dr. L. Margolis, the Station's parasitologist, "milkiness" is always associated with an abundance of a myxosporidian of the genus Chloromyxum. This parasitic protozoan may be the cause of the condition which manifests itself in the softening and liquefaction of lemon sole muscle tissue. Softening is rarely evident in freshly caught fish, but it develops rapidly after death. Since the spore requires no intermediate host, it may be presumed that the incidence of infection in a stock of fish would be highest under conditions of high density.

(over)

 ABSTRACTER: Martin Heerdt

9.4 COOPERATION AT TAMPA

Anonymous
Southern Fisherman 16, 36-41, 43-49 (March 1956)

The Tampa Shrimp Producers Association was formed about two years ago to provide large volume shrimp marketing from the producer's level and to provide control of quality of all shrimp marketed through the association.

Operations are under the supervision of a general manager who markets the shrimp and supervises a staff of three inspectors, an office manager, a secretary, and a bookkeeper.

All shrimp marketed through the association is inspected and graded at the unloading dock by one of the inspectors. The first trawler to leave the shrimping grounds brings the catch of the other association trawlers to port in order to insure maximum freshness. Each lot of shrimp is inspected and graded separately, iced and packed separately, and the name of the trawler as well as the grade and size is placed on the tag on each box for each owner.

The series of photographs reproduced on this card show the unloading of shrimp by a mechanical boat unloader. Shrimp are shovelled into the buckets of the machine which carry them from the hold and dump them on the conveyor which carries them into the plant.

See illustrations, over.

(over)

 ABSTRACTER: Kathryn L. Osterhaug

SODIUM AND POTASSIUM IN FISH

"MILKINESS" OF LEMON SOLE

CALIFORNIA FISHING LAWS

SHRIMP COOPERATIVE

B. 15 (Cross Reference: 0.5, 1.69)

The number of lemon sole present at the start of fishing in Union Bay was approximately 800,000 pounds. Exploitation reduced the stock to roughly 400,000 pounds at the start of fishing in 1954. By that time "milkiness" had practically disappeared.

Milkiness is known to occur in all lemon and rock sole stocks of British Columbia, but its severity is seldom of economic significance. Infected fillets are not very likely to escape the notice of plant workers and to enter retail outlets. Furthermore, the protozoan responsible for milkiness in sole is harmless to man.

B. 4 (Cross Reference: 1.85, 2.6, 3.26)

B. 3 (Cross Reference: 1.0114)

Skin diving and underwater breathing devices are legal for taking lobsters by hand, but sale of lobsters so taken is prohibited.

Another measure prohibits the sale or purchase of rock scallops.

B. 42 (Cross Reference: 1.0111)

Sodium and potassium content of raw flesh of fresh spring, coho, sockeye, chum, and pink salmon, lingcod, greycod, halibut, and frozen stored herring.

Species analyzed	Size*	Month caught	Number of fish analyzed	Sodium		Potassium	
				Average	Range	Average	Range
				(mg. per 100 grams)		(mg. per 100 grams)	
Red spring salmon	Small	April	9	55.7	53.5 - 58.0	352	330 - 395
"	"	May	24	57.7	50.5 - 61.5	408	375 - 445
"	"	June	3	51.4	49.2 - 54.2	408	395 - 430
"	"	July	6	37.5	35.0 - 40.0	418	417 - 420
"	"	August	7	39.5	35.2 - 45.0	447	410 - 470
"	Medium	May	11	39.4	32.0 - 47.5	376	350 - 408
"	Large	May	15	38.2	31.0 - 45.0	371	320 - 408
White spring salmon	Medium	June	2	37.3	33.0 - 41.5	409	408 - 410
				(mg. per 100 grams)		(mg. per 100 grams)	
Coho salmon (*O. kisutch*)	Small	June	9	54.3	51.5 - 57.5	428	420 - 440
"	Small	July	10	50.8	42.0 - 57.5	409	385 - 450
"	Medium	July	21	39.7	33.0 - 45.9	427	420 - 440
Sockeye salmon (*O. nerka*)	Small	July	42	47.5	39.2 - 60.0	391	340 - 453
Pink salmon (*O. gorbuscha*)	Small	August	6	56.1	48.0 - 70.0	443	410 - 485
Chum salmon (*O. keta*)	Medium	November	6	49.7	47.9 - 54.3	429	404 - 440
				(mg. per 100 grams)		(mg. per 100 grams)	
Lingcod (*Ophiodon elongatus*)	Small	May	12	54.9	48.0 - 67.2	418	380 - 460
"	Medium	May	6	51.8	49.5 - 54.1	478	475 - 480
Gray cod (*Gadus macrocephalus*)	Small	May	16	71.2	60.5 - 83.5	392	340 - 432
Halibut (*Hippoglossus stenolepis*)	Small	May	28	58.9	51.0 - 64.0	452	420 - 485
"	Medium	May	9	62.0	49.5 - 70.0	475	435 - 510
Herring (*Clupea pallasii*)	Small	Sept.	9	74.0	73.0 - 74.5	367	355 - 380

* Small: 2 to 7 lb.; medium: 7 to 20 lb.

0.31 THE SYNTHETICAL PREPARATION OF PURE SQUALENE

Dicker, D. W. and Whiting, M. C. (The Dyson Perrins Laboratory, Oxford University)
Chemistry & Industry No. 17, 351 (May 5, 1956)

The treatment of "geranylacetone" with the Wittig reagent from I: 4-dibromobutane and triphenylphosphine, gave a mixture of the stereoisomers of squalene free from structural isomers.

0.33 CHITIN. III. ADSORPTION OF PROTEINS TO CHITIN

Hackman, R. H. (Commonwealth Sci. Ind. Research Organization, Canberra)
Australian J. Biol. Sci. 8, 530-6 (1955)
Chemical Abstracts 50, 3513 (March 10, 1956)

0.5 (Cross Reference: 1.70, 2.01)

STUDIES IN THE BACTERIOLOGICAL CHEMISTRY OF SHARK MUSCLE SPOILAGE. II. ON THE ISOLATION OF UREA SPLITTING BACTERIA AND THEIR UREASE ACTIVITY

Kimura, Takahisa
Bulletin of the Faculty of Fisheries, Hokkaido University 6, 310-316 (February 1956) (English abstract, tables, and figures)

Twenty-three strains were isolated by enrichment technique. Five strains had very strong urease activities but only one was able to grow on medium using urea only as nitrogen source.

0.6 EVALUATION OF CANNING PROCESSES

Evans, H. L.
Food Preservation Quarterly 15, 45-51 (1955)

(Abstract of this article appears under 3.33 page 11 - April 1956)

0.8 (Cross Reference: 3.234)

PREDICTING TEMPERATURE CHANGES IN FROZEN LIQUIDS

Keller, George H. and Ballard, John H.
Industrial and Engineering Chemistry 48, 2 (February 1956)

0.118 INSTRUMENTATION IN QUALITY CONTROL PART II

Gould, Wilbur A.
Food Packer 37, 30-31 (April 1956)

(Abstract of this article appears under 7.8 page 19 - August 1956)

1.0141 NORWAY'S SUCCESS IN FISHERMAN'S VOCATIONAL TRAINING

Anonymous
Canadian Fisherman 9, 19 (January 1956)

(Abstract of this article appears under 9.7 page 17 - July 1956)

1.0141 THE NORWEGIAN WINTER HERRING FISHERY I.

Egenaes, W. Nitter
Norwegian Fishing News 2, 12-13 (March 1955)

(Abstract of this article appears under 1.2 page 19 - October 1955)

1.2 CHARACTERIZATION OF BACTERIA RESPONSIBLE FOR THE SPOILAGE OF HERRING PRESERVES

Nikkilä, Olavi E. (University of Turku, Finland)
Reprinted from Suomen Kemistilehti B 28, 1-3 (1955)

(Abstract of this article appears under 3.8 page 13 - February 1956)

1.70 BACTERIAL FLORA OF FRESH SHARK

Venkataraman, R. and Sreenivason, A.
Current Science 24, 380-381 (November 1955) (Reprinted)

(Abstract of this article appears under 0.5 page 1 - October 1956)

1.82 (Cross Reference: 1.0116)

THE HARDSHELL CLAM FISHERY OF MARYLAND WATERS

Sieling, F. W.
Maryland Tidewater News 12, Supplement No. 9 (March 1956)

2.02 POST MORTEM CHANGES IN MEAT AND THEIR POSSIBLE RELATION TO TENDERNESS TOGETHER WITH SOME COMPARISONS OF MEAT FROM HEIFERS, BULLS, STEERS AND DIETHYLSTILBESTROL TREATED BULLS AND STEERS

Wierbicki, Eugen; Kunkle, L. E.; Cahill, V. R.; and Deatherage, F. E.
Food Technology 10, 80-86 (February 1956)

(Abstract of this article appears under 0.36 page 1 - June 1956)

2.111 THE TENSILE STRENGTH OF AMILAN NETTING CORDS OF VARIOUS TWIST

Kouzumi, Takashi
Bulletin of the Japanese Society of Scientific Fisheries 21, No. 3, 139-140 (1955) (English abstract and figures)

2.111 ON THE RELATIONSHIP BETWEEN THE SOCIALITY IN A SCHOOL OF FISHES AND THE INTERCEPTING EFFECT OF NETS IN THE JAPANESE MINNOW, ORIZIAS LATIPES (T. et S.)

Ochiai, Akira and Asano, Hirotoshi
Bulletin of the Japanese Society of Scientific Fisheries 21, No. 3, 154-158 (1955) (English abstract, figures, and tables)

Alone, a fish is very cautious. Fishes in a school, however, are not so cautious. The intercepting effect of a net disappears when the mesh is 1.0 cm. for schools of 5 and 10 fishes, and 1.5 cm. for a school of 3.

2.1121 ON THE RESISTANCE OF VARIOUS COD ENDS FIXED IN A STREAM--I.

Taniguchi, Takeo
Bulletin of the Japanese Society of Scientific Fisheries 21, No. 5, 291-296 (1955)

If the size and shape at the opening of cod ends, the total area of webbings, the kind of netting cord, and the angle between the adjacent arms of net are equal; the resistance of each type of cod ends is about the same as each other, both from the results of the theory and the experiments.

2.1124 THE DECREASING STRENGTH OF SET NETS DURING THE SUBMERSION PERIOD, AND THE MINIMUM FOR UTILITY

Miyamoto, Hideaki; Nomura, Masatsune; Shiota, Eiji; and Nozawa, Yasushi
Bulletin of the Japanese Society of Scientific Fisheries 21, No. 6, 369-377 (1955) (English summary)

A study was made of the process through which net fabrics wear out in use and the minimum workable strength of netting for the trapping operations was determined.

2.1127 A 75-FOOT RESEARCH VESSEL FOR KELVIN HUGHES

Anonymous
World Fishing 5, 40 (March 1956)

2.119 FLEET INSURANCE POOL FOR SAVING

Anonymous
Southern Fisherman 16, 22 (February 1956)

How New Bedford boat owners have saved money through group coverage on their fleet.

2.14 STATISTICAL ANALYSES OF THE INFLUENCES OF VARIOUS LIGHTS UPON THE DISTRIBUTION OF FISHES IN AQUARIUM--I. THE INFLUENCE OF VARIOUS LIGHTS UPON THE DISTRIBUTION OF DARK ADAPTED FISHES

Maeda, Hiroshi (Shimonoseki College of Fisheries)
Bulletin of the Japanese Society of Scientific Fisheries 21, No. 3, 159-163 (1955) (In English)

A difference in the light intensity causes significant difference in the number of fishes in the frontal and middle sub-division of the illuminated half and in the other half of the aquarium.

2.14 REACTION OF TUNA TO STIMULI, 1952-53. PART I. RESPONSE OF TUNA TO CHEMICAL STIMULI. PART II. RESPONSE OF TUNA TO VISUAL AND VISUAL-CHEMICAL STIMULI

Tester, Albert L.; van Weel, P. B.; Naughton, John J.; and Hsiao, Sidney C. (Pacific Oceanic Fisheries Investigation and Hawaii Marine Laboratory, University of Hawaii)
Special Scientific Report: Fisheries No. 130, United States Department of the Interior, Fish and Wildlife Service, Washington, D. C. (March 1955)

(Abstract of this article appears under 1.10 page 1 - November 1955)

2.9 PUFFERFISH TOXIN

Macomber, Robert D. (Coll. of Med. Evangelists, Loma Linda, California)
J. Wash. Acad. Sci. 46, 85 (1956)
Chemical Abstracts 50, 8919-8920 (June 25, 1956)

2.9 BIOLOGICAL VALUE OF FISH PROTEIN

Bramstedt, F. (Univ. Hamburg, Germany)
Fette u Seifen Anstrichmittel 56, 527-30 (1954)
Chemical Abstracts 50, 3660 (March 10, 1956)

2.9 STUDIES ON THE NUTRITIVE VALUE OF THE MEAT OF SEA CUCUMBER (STICHOPUS JAPONICUS SELENKA)

Tanikawa, Eiichi; Akiba, Minoru; Yoshitani, Setsuko; Ishiko, Hirotoshi; Motohiro, Terushige; and Wakasa, Tetsuro
Bulletin of the Faculty of Fisheries, Hokkaido University 5, 338 (February 1955); and 6, 37 (May 1955) (In English)

(Abstract of this article appears under 1.9 page 1 - May 1956)

3.238 ANNUAL REPORT TO THE DANISH FISHING INDUSTRY

Anonymous
Aarsberetning fra Fiskeriministeriets Forsøgslaboratorium for 1954, 32 pages (1955) Copenhagen, Denmark

(Abstract of this article appears under 2.15 page 5 - January 1956)

3.30 REEFER TANKS KEEP FISH FRESH, CUT WEIGHT LOSS

Bloomberg, Ray
Food Engineering 27, 111, 159 (September 1955)

(Abstract of this article appears under 2.15 page 7 - March 1956)

3.30 CONVENIENCE - PLUS QUALITY

McLean, Beth Bailey
Canner 121, 12-13 (December 29, 1955)

(Abstract of this article appears under 2.6 page 19 - April 1956)

3.6 EVALUATION OF AMINO ACIDS IN FISH PROCESSED BY VARIOUS METHODS

Proctor, B. E. and Lahiry, N. L.
Food Research 33, 91-92 (January-February 1956)

(Abstract of this article appears under 7.522 page 15 - August 1956)

3.60 NEW DEVELOPMENTS IN THE DEHYDRATION OF FRUITS AND VEGETABLES

Tressler, Donald K. (QM Food and Container Institute for the Armed Forces, Chicago, Illinois)
Food Technology 10, 119-124 (March 1956)

Dehydrated vegetables, fruits, and fruit juices of excellent quality which retain their flavor, aroma, color, and texture during storage for 2 years at 70° F. or 6 months at 90° to 100° F. are now a reality. These products have resulted from improved techniques such as: (1) sulfuring, (2) dehydration to very low moisture content by the use of in-package desiccants, and (3) the use of low temperature dehydration of which puff drying in high vacuum is an example.

3.64 CATALYTIC REMOVAL OF OXYGEN FROM FOOD CONTAINERS

King, J.
Food Manufacture 30, 441-443 (November 1955)

(Abstract of this article appears under 3.38 page 11 - June 1956)

3.7 CHANGE OF THE MUSCLE TEMPERATURE OF FISH DURING THE COURSE OF DRYING I.

Maruichi, Teizo; Shimazu, Yoshihiko; and Hino, Yoshiaki
Bulletin of the Japanese Society of Scientific Fisheries 21, No. 6, 437-440 (1955) (English abstract and figures)

Muscle temperature was found higher than that of atmospheric temperature, possibly owing to the heat of solar irradiation.

4.21 21ST ANNUAL REVIEW OF THE LITERATURE ON FATS, OILS, AND DETERGENTS. I.

Piskur, M. M.
Journal of the American Oil Chemists' Society 32, 255-271 (May 1955)

(Abstract of this article appears under 4.00 page 13 - February 1956)

4.22 HYDROGENATION OF SHAD OIL

Waisgluss, Fernando and Brenner, Rodolfo R.
Industria y quimica (Buenos Aires) 17, 13-18 (1955)
Chemical Abstracts 50, 502 (January 10, 1956)

4.89 COD LIVER OIL IN PROCTOLOGIC PRACTICE

Marks, Mark M. (Menorah Medical Center, Kansas City, Missouri)
Missouri Medicine, pp. 187-189 (March 1955) (Reprinted)

4.89 COD LIVER OIL OINTMENT FOR LOCAL THERAPY IN DERMATOSES OF THE NEWBORN INFANT

Heimer, Caryl B.; Grayzel, Harold G.; and Kramer, Benjamin (Jewish Hospital of Brooklyn, New York)
Archives of Pediatrics 68, 383-387 (August 1951) (Reprinted)

4.89 DERMATOLOGIC THERAPY WITH COD LIVER OIL OINTMENT

Behrman, Howard T.; Combes, Frank C.; Bobroff, Arthur; and Leviticus, Rene (Bellevue Hospital, New York)
Industrial Medicine and Surgery 18, 512-518 (December 1949) (Reprinted)

4.89 EXTERNAL COD LIVER OIL IN PROCTOLOGY

Spiesman, Manuel G. and Malow, Louis
The American Journal of Proctology 7, 211-216 (June 1956) (Reprinted)

LIST OF PUBLICATIONS REGULARLY ABSTRACTED

Analyst
Analytical Chemistry
Archives of Biochemistry and Biophysics
Biochemical Journal
Bulletin of the Faculty of Fisheries, Hokkaido University
Bulletin of the Japanese Society of Scientific Fisheries
California Fish and Game
Canadian Fisherman
Canadian Journal of Chemistry
Canadian Journal of Technology
Canner
Chemical Abstracts
Chemical and Engineering News
Chemical Engineering
Chemical Processing
Chemistry and Industry
Commercial Fisheries Review
Drug and Cosmetic Industry
FAO Fisheries Bulletin
Federation Proceedings
Feedstuffs
Fisheries Newsletter (Australia)
Fish. Res. Bd. Can., Prog. Repts. Atlantic Coast Stas.
Fish. Res. Bd. Can., Prog. Repts. Pacific Coast Stas.
Fishing Gazette
Flour and Feed
Food Engineering
Food Manufacture
Food Packer
Food Preservation Quarterly
Food Processing
Food Research
Food Science Abstracts
Food Technology
Frosted Food Field
Gourmet
Industrial and Engineering Chemistry
Industrial Refrigeration
Institutions
Journal of Agricultural and Food Chemistry
Journal of Applied Chemistry
Journal of Biological Chemistry
Journal of Nutrition
Journal of the American Chemical Society
Journal of the American Dietetic Association
Journal of the American Oil Chemists' Society
Journal of the Association of Official Agricultural Chemists
Journal of the Fisheries Research Board of Canada
Journal of the Science of Food and Agriculture
Maine Coast Fisherman
Meldinger Fra SSF (Herring Industry, Norway)
Modern Packaging
Modern Refrigeration
National Fisherman
National Provisioner
Nature
Nutrition Reviews
Pacific Fisherman
Pan American Fisherman
Poultry Science
Practical Home Economics
Progressive Fish-Culturist
Quick Frozen Foods
Refrigerating Engineering
Report of the Food Investigation Board (Great Britain)
Science
Southern Fisherman
Trade News (Fisheries Department, Canada)
Western Fisheries
World Fishing

Articles chosen for abstracting or inclusion as bibliographical references are those deemed of interest to the commercial fisheries and to fishery technological laboratories. Occasionally pertinent articles from sources other than the above listed publications are included. Biological papers are generally omitted.

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Editorial Clerk (Typist)--Gladys K. Chandler

4.9 STUDIES ON THE EGG FAT OF SHARK (SQUALUS SUCKLII (GARARD))

Zama, Koichi; Katada, Muneo; and Igarashi, Hisanao
Bulletin of the Japanese Society of Scientific Fisheries 21, No. 4, 244-247 (1955) (English abstract and tables)

Mixed fatty acids were found to consist approximately of myristic acid 3 percent, palmitic acid 10 percent, stearic acid 7 percent, arachidic acid 4 percent, zoomaric acid 13 percent, oleic acid 21 percent, $C_{20}H_{38}O_2$ 10 percent, $C_{22}H_{42}O_2$ 5 percent, linolenic acid 5 percent, $C_{20}H_{32}O_2$ 10 percent, and $C_{22}H_{34}O_2$ 10 percent, and a small quantity of $C_{20}H_{38}O_2$. The unsaponifiable material was obtained as 12.5 percent of the total fat.

4.91 THE HYDROGENATION OF DIETARY UNSATURATED FATTY ACIDS BY THE RUMINANT

Reiser, Raymond and Reddy, H. G. Ramakrishna (Department of Biochemistry and Nutrition, Texas Agricultural and Mechanical College System, College Station, Texas)
The Journal of the American Oil Chemists' Society 33, 155-156 (April 1956)

Goats were fed alfalfa meal containing 10 percent cottonseed or linseed oil. After 11 weeks the fatty acids of rumen, stomach, and caecum contents were compared to those of the feed.
It was found that the high levels of linoleic and linolenic acids of the feed were reduced to very low levels in the rumen, with comparable increases in the saturated acids.

6.190 3-LB. BROILERS IN 8 WEEKS ON 1.96 FEED CONVERSION RATE

Anonymous
Feedstuffs 28, 1 (March 24, 1956)

These results came in one of the pens in Broiler Trial No. 15 at the Maryland Agricultural experiment sub-station at Salisbury. The birds were raised under practical conditions, on a mash feed containing 12 percent fat.

6.191 PROTEIN QUALITY AND AVAILABLE LYSINE IN ANIMAL PRODUCTS

Carpenter, K. J. and Ellinger, Gabrielle M.
Poultry Science 34, 1451-1452 (November 1955)

(Abstract of this article appears under 7.51 page 17 - October 1956)

6.195 THE EVALUATION OF WHALING BYPRODUCTS AS FEEDING-STUFFS

Carpenter, K. J.; Ellinger, G. M.; and Shrimpton, D. H. (Rowett Research Institute, Bucksburn, Aberdeenshire)
Journal of the Science of Food and Agriculture 6, 296-304 (June 1955)

(Abstract of this article appears under 6.190 page 17 - December 1955)

6.237 STUDIES ON THE CONCENTRATION OF LIVER OILS--III. ON THE CONCENTRATION OF OILS WITH FURFURAL, ANILINE, ETC.

Inagaki, Makoto and Kazuo, Matsuda
Bulletin of the Japanese Society of Scientific Fisheries 21, No. 1, 42-53 (1955) (English abstract, figures, and tables)

Good results were obtained with a furfural to oil ratio of 3 to 1. Repeated extraction was best. Aniline proved of use for concentrating vitamin oils.

6.237 STUDIES ON UTILIZATION OF THE LIVER OIL OF DEEP SEA SHARKS--XI. VITAMIN A CONTENT AND MOLECULAR DISTILLATION OF THE LIVER OIL OF DEEP SEA SHARKS

Higashi, Hideo; Kaneko, Tokugoro; and Sugii, Kisaburo
Bulletin of the Japanese Society of Scientific Fisheries 21, No. 6, 448-453 (1955) (English abstract, tables, and figures)

The amount of vitamin A was found to increase through molecular distillation of the liver oils of Centrophorus sp., Centroscymnus owstoni, Centrophorus sp. and mixed liver oil of various deep sea sharks.

6.3 STUDIES ON THE PREPARATION AND THE UTILIZATION OF ALGINIC ACID DERIVATIVES--IV. THE PALMITOYLATION OF ALGINIC ACID BY THE MODIFIED SCHOTTEN-BAUMANN PROCESS

Abe, Yoshiro and Ihara, Toyoko
Bulletin of the Japanese Society of Scientific Fisheries 19, No. 6, 737 (1953) (English summary and figures)

6.63 INFLUENCE OF FORMIC ACID ON THE HYDROLYSIS OF TISSUE PROTEINS. A NEW AND RAPID METHOD OF HYDROLYSIS OF PROTEINS

Gurnani, S. U.; Kumta, U. S.; and Sahasrabudhe, M. B.
Food Science Abstracts 27, 613 (November 1955)

6.84 STUDIES ON THE IRIDESCENT SUBSTANCES OF FISH SCALES II.

Obata, Yataro and Marutani, Teigiro
Bulletin of the Japanese Society of Scientific Fisheries 19, No. 5, 639 (1953) (English summary, tables, and figures)

The essence from Tachi-uo and Hokkaido herring was purified with sodium dodecyl benzene sulfonate or poly-ethyleneglycol (emulsifying agent). After this purification, each essence could be used as well as that from American herring for coating imitation pearls.

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7.51 PROTEIN IN FISH SCALE

Solomons, C. (Univ. Witwatersrand, Johannesburg)
S. African J. Med. Sci. 20, 27-8 (1955)
Chemical Abstracts 50, 2079 (February 10, 1956)

7.51 PROPOSAL FOR A NEW NITROGEN FACTOR FOR THE CALCULATION OF PROTEIN CONTENT OF THE EDIBLE PORTION OF THE HERRING

Brandes, C. H. and Dietrich, R. (Inst. Meeresforsch., Bremerhaven, Germany)
Fette u Seifen Anstrichmittel 56, 499-503 (1954)
Chemical Abstracts 50, 2888 (February 25, 1956)

7.72 REPORT ON FISH AND OTHER MARINE PRODUCTS

Voth, Menno D.
Journal of the Association of Official Agricultural Chemists 38, 194-196 (May 1955)

(Abstract of this article appears under 7.7 page 15 - October 1955)

7.89 THE STRUCTURE - MECHANICAL PROPERTIES OF BREAM MUSCLE TISSUE

Voskresensky, N. A.
Rybnoe Khozyaistvo, pp.56-61 (May 1955)

(Abstract of this article appears under 7.1 page 15 - March 1956)

8.51 STUDIES ON THE CRYSTALLINE STYLE OF MOLLUSCS--II. CHEMICAL CONSTITUENTS OF THE STYLE OF MACTRA SULCATARIA REEVE (PART 2)

Hashimoto, Yoshiro and Sato, Tokuji (Faculty of Agriculture, Tokyo University)
Bulletin of the Japanese Society of Scientific Fisheries 21, No. 5, 352-356 (1955)

Neutral sugar components of the crystalline style of Mactra sulcataria, were isolated by the use of ion-exchange resins and hydrocellulose column. Fucose, xylose, mannose, and galactose were identified as their derivatives and the presence of desoxyribose and acetylhexosamine was also detected.

8.51 THE FAT AND WATER CONTENT OF HERRING

Brandes, C. H.
Symposium on cured and frozen fish technology, Swedish Institute for Food Preservation Research, Goteborg, No. 100, Chapter XII (November 1953)

(Abstract of this article appears under 8.53 page 17 - October 1955)

8.59 L-AMINO ACID OXIDASES OF THE HEPATOPANCREAS OF LAMELLI-BRANCH MOLLUSCS

Glahn, Poul Egede; Manchon, Philippe; and Roche, Jean (Lab. biol. marine, Concarneau, France)
Compt. rend. soc. biol. 149, 509-13 (1955)
Chemical Abstracts 50, 1218 (January 25, 1956)

8.612 VITAMIN A IN FISH MEAT IV. VITAMIN A CONTENT IN THE SKIN OF FISHES

Hirao, Shuichi; Yamada, Juami; and Kikuchi, Ryo
Bulletin of the Japanese Society of Scientific Fisheries 21, No. 6, 454-457 (1955)

In many fishes the vitamin A content of the skin was richer than that of the flesh.

8.65 VARIATION IN THE ASCORBIC ACID CONTENT OF THE CORPUSCLES OF STANNIUS OF ADULT SALMON (SALMO SALAR) WITH SEX AND GENITAL MATURITY

Fontaine, M. and Hatey, J. (Lab. physiol., Museum, Paris)
J. physiol. (Paris) 47, 725-30 (1955)
Chemical Abstracts 50, 6692 (May 10, 1956)

9.11 MID-PACIFIC OCEANOGRAPHY PART IX, OPERATION NORPAC

McGary, J. W.; Jones, E. C.; and Austin, T. S. (Pacific Oceanic Fishery Investigations, U. S. Fish and Wildlife Service, Honolulu, T. H.)
Special Scientific Report: Fisheries No. 168 (January 1956)

Contents: I, Field procedures. A. Primary missions. 1. Oceanography. 2. Plankton. B. Secondary missions. 1. Meteorological observations. 2. Tuna abundance. 3. Miscellaneous biological collections. 4. Miscellaneous observations. II. Records. III. Personnel. IV. Laboratory methods and techniques. A. Oceanographic data. B. Plankton. V. Literature cited. VI. Appendix (John R. Manning cruise 26).

9.15 AN ANALYSIS OF STARFISH CONTROL MEASURE AS PRACTICED BY OYSTERMEN

Lee, Charles F.
National Fisherman 36, 19-20 (May 1955)

(Abstract of this article appears under 1.81 page 1 - October 1955)

9.7 FLORIDA

Anonymous
Commercial Fisheries Review 18, 17 (March 1956)

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